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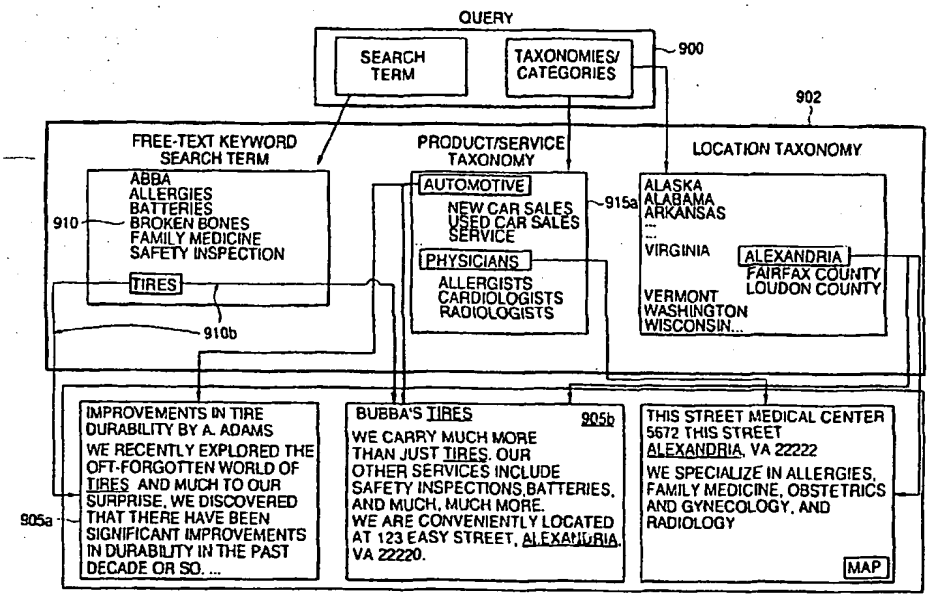
(54) Title: METHODS AND SYSTEMS FOR ENABLING EFFICIENT RETRIEVAL OF DATA FROM DATA COLLECTIONS



(57) Abstract: The present invention relates to systems and methods for interactively searching a database (905) in such a manner that it is quick and easy to search, drill down, drill-up and drill across a data collection (905) presenting the user with summary information using multiple independent hierarchical category taxonomies (915) of the data collection (905). The present invention also relates to business methods associated with providing information to users based on the searching systems and methods, and the revenue stream attached thereto. The present invention also relates to retrieving information from a database based on content aggregation, management and distribution.

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METHODS AND SYSTEMS FOR ENABLING EFFICIENT RETRIEVAL OF DATA FROM DATA COLLECTIONS

BACKGROUND OF THE INVENTION

Cross-Reference to Related Applications

Further, this application claims priority to and incorporates by reference in its entirety provisional application serial no. 60/193,263, filed March 30, 2000 entitled "METHODS AND SYSTEMS FOR ENABLING EFFICIENT RETRIEVAL OF DATA FROM DATA COLLECTIONS"

Field Of The Invention

The present invention relates to systems and methods for interactively searching a database in such a manner that it is quick and easy to search, drill down, drill-up and drill across a data collection presenting the user with summary information using multiple independent hierarchical category taxonomies of the data collection. The present invention also relates to business methods associated with providing information to users based on the searching systems and methods, and the revenue stream attached thereto. The present invention also relates to [delete: building and maintaining] retrieving information from a database based on content aggregation, management and distribution.

Description of the Related Art

The present invention is directed to systems and methods for quickly and efficiently retrieving information from a collection of data or database. For purposes of example, the Internet is the paragon of a collection of data from which it is difficult to efficiently extract

desired data. But it will be appreciated that the present invention is applicable to any collection of data or database.

There is currently more information floating around than at any time in our history. Information exists in the millions upon millions of books, documents, records, libraries, archives, directories, databases, and catalogs that individuals all must use to work, live, and connect with other human beings. But while there is more information available and more ways to access it than ever before, finding information individuals need when they need it still remains one of the most challenging, time-consuming, and frustrating experiences of life in the modern age.

From the earliest conception of the Internet until the present time, one of the challenges facing anyone seeking to use the Internet is figuring out how to find a specific, relatively small amount of information from among the vast amount available on the Internet. Today, a whole industry is devoted to the development of better ways and means to help people do just that. One such group of developments is search engines. Search engines allow users to type in a term and receive back a laundry list of Web sites that are associated with that term.

The act of accessing the Internet to obtain or find information has come to be called "searching" the Internet or "surfing the Web" which is directed at a very popular part of the Internet, the World Wide Web ("Web" for short). When a person initiates a "search" on the Web he or she attempts to find information using one or more methods presently at their disposal. Various methods for conducting Internet searches have been implemented. However, these conventional methods suffer from a variety of shortcomings.

Figure 1 is a visual representation of a database 1. This database 1 is made up of a plurality of records 2. Each record may consist of a single character, a string of characters, a plurality of strings of characters, an image, an audio file or any combination of the preceding.

The size of the database 1 can be described by making reference to the number of records 2 within it. Large databases may contain millions of records.

The task of an Internet search engine is to provide the user with a list of links to Web sites that the search engine calculates are likely to hold information desirable to the user. This list is compounded by using a search term or query 3. One method of compounding this list is a full-text algorithm. A "full-text" search algorithm identifies records that contain key term(s) in each and every record. In other words, the search process effectively identifies records such as record 2 that contain the search term 3. When the search is completed, a numerical count of the total number of records containing the search term(s) is compiled and displayed along with a list of links to those records to allow the user to view the records. That is, the number of matches, e.g., "2,000 matches," links and descriptions of the first few matching records are displayed to the user. The user reviews the number of matches and the provided descriptions of some of the matched records and either decides to try a different search in an attempt to shrink the number of matches or selects one listed link to access a particular record.

One problem with these types of search engines is the often-large number of matches returned to the user. If a user enters the search term "tires," he/she may receive over 1 million matches. Almost no user will wade through all 1 million records looking for the best or specific record that he/she needs.

If the user edits the search term(s), he/she may pare the number of matches down from 1 million to 200,000, but this number of matches is still too large for a user to view and use to make an effective decision. The user may then try to re-edit the search terms in an iterative process until the number of matches is manageable. However, this iterative process of re-editing search terms is time consuming and may frustrate the user before he/she receives the desired data.

In an effort to reduce this frustration, search engines were developed that categorize the records and provide the categories to the user so that he/she may reduce the number of records before executing a search using search term(s).

Figure 2 shows some records 205, 210 and 215 from database 1. These records are categorized. The exemplary categories 250 shown are "Virginia," "Fairfax," "McLean," "Reston," and "Chantilly." These categories 250 relate to state, county, and city.

One method of categorizing records is to apply tags to each record. For example, if a record contains data which relates to a certain geographic area such as a state, then that record is tagged with a unique tag identifying its relationship to that state. Other records that do not contain data related to that geographic area are not tagged with that unique tag. These tags are later used to identify and retrieve records containing data related to certain geographic areas. As a further example, if a record contains the word "Virginia," then that record is tagged with a tag called "VA."

The categorized records 205, 210 and 215 are tagged with a single taxonomy because all of the categories 250 represent a class or subset of the taxonomy "Location." Assuming all of the records within database 1 are categorized, database 1 can be referred to as a "single-taxonomy, categorized database."

Given these definitions, it is clear that a taxonomy is a hierarchical organization of categories and the various taxonomies and categories inherent to a database can be used to organize the records in a database. This organization of the records, in turn, makes it easier to search for, retrieve, and display records containing specific data. In other words, a user may use the taxonomies and categories to search database 1 if the records in database 1 are properly tagged.

Typically, taxonomies and categories are selected from among those characteristics and attributes which a user would intuitively think of to launch a search. For instance, a user

attempting to find a physician in McLean, Virginia, using a Web search engine would formulate a search based on certain intuitive characteristics, one being the "location" of all of the physicians in database 1. This intuitive characteristic becomes a taxonomy. This search can be narrowed by using attributes, such as "state," "county" and "city." These intuitive attributes are categories within the taxonomy.

One problem with most conventional search tools based on categories is that they only provide the user with a single taxonomy. For example, assume that a user searches using a taxonomy called "Location" and a category called "Virginia" to identify all of the pharmacists in Virginia. Suppose now, however, the user wishes to identify only those pharmacists who are "retail" pharmacists. For a single-taxonomy, categorized search this means launching a new search because "retail" is neither an attribute nor a characteristic related to "location." Instead, "retail" is independent of location and is related to a different taxonomy, such as "Products and Services."

To try to alleviate this problem, many single-taxonomy, categorized search engines allow Boolean operations. Thus, if the user discovers that there are 10,000 pharmacists in Virginia, he/she may further refine this search by searching for the word "retail." Thus, the user edits the search to be "Pharmacists" AND "Health Insurance and Information" in the category "Virginia." This type of search modification is only marginally effective, for several reasons. First, the use of a Boolean search at this point usually entails the initiation of a new search. Second, the search engine, because it does not provide a taxonomy, cannot suggest terms for narrowing the search to the desired data, which requires the user to be clear about and know the Boolean query terms in advance. Third, such a search engine is inefficient because it requires an exponential increase in the number of operations to produce a set of hits.

Another problem with finding information in product catalog databases is that the user is often asked to choose multiple parameter attributes that end up defining a product that doesn't exist. For example, a user may be interested in finding a used automobile satisfying the following criteria: greater than 200 horsepower, less than 10,000 miles, greater than 50 miles per gallon fuel efficiency, and a price less than $10,000. After spending time naming all these parameters, the search may reveal that no product contains all these attributes. An alternative embodiment in the present invention is to have the user first specify the one or two attributes that are most important and then present the user only with valid, non-zero categories regarding products in the catalog. For example, in a "step search" process, the user might consider the attribute of in excess of 200 horsepower as the most important. The system would then inform the user how many cars there are that contain this attribute and allow the user to view these results from a variety of perspectives, like by price (e.g. 10 between $10,000-$20,000, 50 between $20,000-30,000 and 100 in excess of $30,000); by fuel efficiency (e.g. 80 between 10-20 mpg, 60 between 20-25 mpg and 20 in excess of 25 mpg); or by mileage (e.g. 50 between 0-20,000 miles, 50 between 20,000-50,000 miles and 60 in excess of 50,000 miles).

In an attempt to address data searching of ever increasing databases, many techniques have been developed. For example, U.S. Pat. No. 5,675,786 relates to accessing data held in large computer databases by sampling the initial result of a query of the database. Sampling of the initial result is achieved by setting a sampling rate which corresponds to the intended ratio at which the data records of the initial result are to be sampled. The sampling result is substantially smaller than the initial query result and is thus easier to analyze statistically. While this method decreases the amount of data sent as a result of the query to the end user, it still results in an initial search of what could be a massive database. Further, dependent upon

the sampling rate, sampling may result in a reduction in the accuracy of the information sent to the end user and may thus not provide the intended result.

Another example, U.S. Pat. No. 5,642,602, relates to a method and system for searching and retrieving documents in a database. A first search and retrieval result is compiled on the basis of a query. Each word in both the query and the search result are given a weighted value, and then combined to produce a similarity value for each document. Each document is ranked according to the similarity value and the end user chooses documents from the ranking. On the basis of the documents chosen from the ranking, the original query is updated in a second search and a second group of documents is produced. The second group of documents is supposed to have the more relevant documents of the query closer to the top of the list. While more relevant documents may be found as a result of the second search, the patent does not address the problems associated with the searching of a large database and, in fact, might only compound them. Additionally, the patent does not return categorized search results complete with counts of the number of records associated with those categories.

Yet another example, U.S. Pat. No. 5,265,244 relates to a method and apparatus for data access using a particular data structure. The structure has a plurality of data nodes, each for storing data, and a plurality of access nodes, each for pointing to another access node or a data node. Information, of a statistical nature, is associated with a subset of the access nodes and data nodes in which the statistical information is stored. Thus statistical information can be retrieved using statistical queries which isolate the subset of the access nodes and data nodes which contain the statistical information. While the patent may save time in terms of access to the statistical information, user access to the actual data records requires further procedures.

Further, U.S. Patent No. 5,930,474 discloses a search engine configured to search geographically and topically, wherein the search engine is configurable to search for user-entered topics within a hierarchically specified geographic area. This system makes use of a static index of results for each taxonomy, not a dynamic search which precludes the ability to switch among multiple taxonomies. The system is also not text searchable at any time during a drill-down, or taxonomy switch. The system also doesn't include counts of records with category results.

U.S. Patent No. 6,012,055 discloses a search system comprising multiple navigators switchable by tabs in the GUI, having the ability to cross-reference amongst said navigators. This is just a method for accessing different information sources, not a method for text-searching. Further, it does not offer user-categorized search results with counts.

U.S. Patent No. 5,682,525 discloses an online directory, having the capability to display an advertisement incorporated within a map display, wherein the said map has indicia for points of interests selected by a user from a drop down menu. This invention describes a technique for identifying targeted advertising based on categories selected within a hierarchical taxonomy. This invention does not consider cross-sections of categories across multiple taxonomies, i.e. location, business type, and products/services. Nor does this invention consider the addition of keyword searches as a further limiting item for identifying targeted advertising.

U.S. Patent No. 6,078,916 discloses a search engine which displays an advertising banner having a keyword associated therewith, wherein the keyword is related to a user-entered search topic. This invention discloses a method for organizing information based on the statistics and heuristical information derived from a user's behavior.

Megaspider, a meta-search engine, has a web directory with hierarchically arranged geographic regions, having subcategories therein for topics, said directory being searchable

within a geographic area or within a topic. However, MegaSpider's search technology employs a static hierarchical drill-down and cannot execute a full-text search and return categorized search results with counts. Additionally, this system only has one hierarchical taxonomy and cannot switch between multiple taxonomies, nor yield categorized search results with counts when searching.

U.S. Patent No. 5,832,497 discloses a system which enables users to search for jobs by geographical location and specialty. While this invention does discuss an iterative method for finding information in a multi-dimensional database, it does not consider categorized search results with counts (i.e. the ability to conduct a field or free-text search and have the results be returned by one or many sets of hierarchically organized categories with counts of the number of records associated with each of those categories), nor the ability to switch among taxonomies.

However, none of these conventional systems provide users with a multiple-taxonomy, multiple category search engine that allows users to search for records, where the user is allowed to toggle among the multiple taxonomies as an aid to locating desired records without constraints.

Traditional search engines are also not generally compatible with small screens such as on cell phones, pagers and personal digital assistants (PDAs) and palm-held devices. This is because these traditional search engines deliver long laundry lists of record hits that the user is required to scroll through. Transmitting these long laundry lists requires substantial bandwidth. Generally, an increase in use of bandwidth by a user translates into an increase in cost. Additionally, these small screens only allow the display of one or two record hits. This makes it cumbersome for the user to compare the record hits to determine which one best suits his/her requirements. The present invention, in contrast, provides a mechanism for

toggling among taxonomies so as to narrow the display such that it may fit onto a small screen.

Additionally, traditional search engines do not provide ways to effectively relate banner advertising to the user viewing the search results. As an example, suppose a user enters the search term "Virginia" AND "Pharmacists." The search engine may place a banner ad on the results Web page to a pharmacy in Virginia that is hundreds of miles away from the user. This ad placement is not valuable to the user or the merchant. Thus, there is also a need to determine what a user is searching for in a more specific manner so that banner advertising may be provided to that user where the advertising is more closely related to what the user is searching for.

SUMMARY OF THE INVENTION

The present invention overcomes the shortcomings identified above. More specifically, the present invention is a multi-taxonomy, multi-category search tool that allows a user to "navigate" through a database using any of the taxonomies at any time.

In addition, the present invention overcomes the identified shortcomings of other search engines when small screen devices are employed to display search results. More specifically, the present invention transmits and displays categories for users to select from rather than providing users with long laundry lists of record hits.

Through the presentation of categorized search results, the present invention allows an enormous database to be represented in a very small footprint, which is ideal for wireless devices.

Further, the present invention provides a mechanism for "slicing-and-dicing" the information in a database, thus, allowing the creation of personalized or customized data collections of information.

The present invention provides such advantages by means of a system for searching a collection of data, said system comprising: an organizer configured to receive search requests, said organizer comprising: a collection of data having at least two entries; wherein the collection of data is organized into at least two taxonomies; wherein each of the at least two taxonomies is associated with at least two categories; wherein the entries correspond to at least one of the at least two taxonomies and also correspond to at least one of the at least two categories; and a search engine in communication with the collection of data, wherein said search engine is configured to search based on the at least two taxonomies and based on the at least two categories, wherein the search engine returns, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the categories associated with the at least first identified taxonomies, along with the number of entries associated with each of the categories associated with the at least first identified taxonomies.

The above advantages are further provided through the present invention, which is a system for searching a collection of data, said system comprising: means for networking a plurality of computers; and means for organizing executing in said computer network and configured to receive search requests from any one of said plurality of computers, said means for organizing comprising: a collection of data having at least two entries; wherein the collection of data is organized into at least two taxonomies; wherein each of the at least two taxonomies is associated with at least two categories; wherein the entries correspond to at least one of the at least two taxonomies and also correspond to at least one of the at least two categories; and means for searching in communication with the collection of data, wherein said means for searching is configured to search based on the at least two taxonomies and based on the at least two categories, wherein the means for searching returns, in response to a search request identifying one of the at least two taxonomies, a list of the categories

associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies.

The above-identified advantages are further provided through a system for searching a collection of data, said system comprising: means for networking a plurality of computers; and means for organizing executing in said computer network and configured to receive search requests from any one of said plurality of computers, said means for organizing comprising: a collection of data having at least two entries; wherein the collection of data is organized into at least two taxonomies; wherein each of the at least two taxonomies is associated with at least two categories; wherein the entries correspond to at least one of the at least two taxonomies and also correspond to at least one of the at least two categories; and means for searching in communication with the collection of data, wherein said means for searching is configured to search based on the at least two taxonomies and based on the at least two categories, wherein the means for searching returns, in response to a search request identifying one of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies.

Additionally, the above-identified advantages are provided through an article of manufacture comprising: a computer usable medium having computer program code means embodied thereon for searching a collection of data, the computer readable program code means in said article of manufacture comprising: computer readable program code means for communicating a search request to a search engine, the search engine being in communication with a collection of data; wherein the collection of data has at least two entries; wherein the collection of data is organized into at least two taxonomies; wherein each of the at least two taxonomies is associated with at least two categories; wherein the at least two entries correspond to at least one of the at least two taxonomies and also correspond to at least one of

the at least two categories; computer readable program code means for querying of the collection of data by the search engine based on the communicated search request; wherein a communicated search request identifies at least one of the at least two taxonomies; and computer readable program code means for returning of a list of the categories associated with the at least one identified taxonomies, along with the number of entries associated with each of the categories associated with the at least one identified taxonomies as a response to the querying of the collection of data.

When potential users navigate a database powered by the present search technology, they are greeted with an "aerial" view of the entire data collection. The invention replicates real-world customer service on the Internet by shaping itself to the needs, priorities, and discretion of the user. In instances where data collection information can be associated with more than one independent category structure (e.g., electronic product catalog, product type, color, size, brand, price, promotions), users of the present invention can switch among taxonomies of the electronic product catalog at any time during the search process and look at information from different perspectives, although in one embodiment of the present invention "step search" taxonomies are not introduced until the user has drilled down to a specific category in the "Product Type" taxonomy. For example, the "Style," "Color," and "Size" taxonomies are "step search" taxonomies because they are not presented as options to the user until the user has selected a clothing category in the "Product Type" taxonomy. Likewise, taxonomies for "Processor Speed," "Hard Disk Size," "Monitor Size," and "Memory Amount" are not presented as options to the user until the user has selected a computer category in the "Product Type" taxonomy.

Step search taxonomies preferably apply to some products in the electronic catalog, while traditional taxonomies, such as "Price," "Promotions" and "Brands", apply to all products in the electronic catalog. A "Monitor Size" taxonomy is obviously inapplicable to a

user searching for clothing products as much as a "Style" taxonomy is inapplicable to a user searching for a computer. A "Price" taxonomy, however, would apply to a user searching for any product.

Users thus have the ability to intuitively navigate through huge amounts of information by using keywords and categories in conjunction with the different taxonomies of the data collection. These navigation features are a significant aspect of this data collection search that differentiates it from conventional search technology.

When a user knows what he/she is looking for, the invention quickly uncovers the right information without forcing the user to go through numerous irrelevant search results. The real power of the search technology comes when users do not know or are only vaguely familiar with what they want. In these instances, where a user needs to browse through all or part of the data listings, keyword searches with categorized search results (from different taxonomies) will facilitate easy navigation by providing the user with context and scope relating to the search results and by giving a user the information he/she needs to find the products, services and information they required.

The present invention provides users with an aerial view of the data collection at all times during a search. Users remain aware of where they stand in their search and how many records potentially satisfy their query. More importantly, users receive categorized search results that provide summary information on the records in the data collection that remain within the parameters of a search.

Users of the present invention can look for information using keywords they feel will help them refine their search. The system will locate every record in the data collection that contains that particular word or phrase and instantly return all the data categories (at the category level of the search as then being conducted) that have associated records. The search results indicate how many records exist within each applicable category, and allow users to

easily hone down on the specific segment of the data collection he/she is interested in and, more importantly, to disregard all other irrelevant information.

For example, if a user enters the search term "wheel alignment," the system would search all the records in the data collection that contained the term "wheel alignment." Rather than returning a long list of 1,701 search results that satisfy the user's query, the present invention provides the user with the categories that are associated with the remaining records and indicates how many records are associated with each category. This functionality assists the user to further refine his/her search and disregard the irrelevant information.

These searched data collections provide users with summary information (categorized search results) about the data collection being searched. Users need not use pull-down menus or fill in any "required" fields to construct the parameters of their search (zip code, city, business category, etc.). Rather, search results display the valid categories and indicate how many records are associated with each applicable category. Users are thus presented with the available options in the data collection (through a dynamic aisle and shelf structure) and can drill down through hierarchically organized data collection information or switch among taxonomies to find what they require.

If a user within the Healthcare Providers Category clicks on "Physician," the present invention proceeds down the hierarchy and presents the user with the next level categories and show the physicians by area of specialization.

In instances where data collection information can be associated with more than one independent category structure (e.g., product type, color, size, brand, price, promotions), users of the present invention can switch among taxonomies of the electronic product catalog at any time during the search process and look at information from different perspectives, although in one embodiment of the present invention "step search" taxonomies are not introduced until the user has drilled down to a specific category in the "Product Type" taxonomy. For

example, the "Style," "Color," and "Size" taxonomies are "step search" taxonomies because they are not presented as options to the user until the user has selected a clothing category in the "Product Type" taxonomy. Likewise, taxonomies for "Processor Speed," "Hard Disk Size," "Monitor Size," and "Memory Amount" are not presented as options to the user until the user has selected a computer category in the "Product Type" taxonomy.

Step search taxonomies preferably apply to some products in the electronic catalog, while traditional taxonomies, such as "Price," "Promotions" and "Brands", apply to all products in the electronic catalog. A "Monitor Size" taxonomy is obviously inapplicable to a user searching for clothing products as much as a "Style" taxonomy is inapplicable to a user searching for a computer. A "Price" taxonomy, however, would apply to a user searching for any product.

If a user clicks on the "Price" tab, the present invention will instantly reorganize all the electronic records that remain within the parameters of the search (regardless of number) and present the same information categorized by a "Price" taxonomy of the electronic product catalog. Switching among taxonomies is possible at any point in the search process. Further, certain taxonomies are designated as "step search" taxonomies are presented to the user as preferred options when the user has drilled down to a specific category in the "Product Type" taxonomy.

The data collections replicate existing business paradigms from the physical world on to the Internet landscape. The dynamic aisle and shelf structure and humanistic interface can help companies retain current users, acquire new customers, and maximize the value of their online traffic. This functionality also spawns new and innovative revenue and business models that help monetize eyeballs and turn Internet browsers into buyers.

It is understood that the Internet provides an unprecedented opportunity to collect and analyze data. The present invention also improves the collection of user data because users

navigate through data collection information by drilling down hierarchically organized categories using their mouse or wireless keypad. Each time the user clicks down a category or switches his/her taxonomy to a different category structure, there is the opportunity to accumulate real-time marketing information that can be responded to interactively or later collected, analyzed and used to derive revenues. Cumulatively, this additional information about customers (demographics, decision patterns, trends, preferences) is more meaningful and can help manage customer relations and product development.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a simplified diagram of a database;

Figure 2 is a simplified view of various records;

Figure 3 is a system in accordance with a preferred embodiment of the present invention;

Figures 4-8 are screen shots a user would see when using an embodiment of the present invention as applied to a yellow page directory;

Figure 9 is a representation of how a query interacts with indices and how those indices relate to records in a database according to an embodiment of the present invention;

Figures 10-12 represent process steps a user would go through to drill down to a set of records in a database, in accordance with an embodiment of the present invention;

Figure 13 is a system in accordance with a preferred embodiment of the present invention;

Figure 14 shows a searching process in accordance with an embodiment of the present invention;

Figure 15 is a screen shot of a categorizer in accordance with an embodiment of the present invention;

Figure 16 is a representation of categories and reads in accordance with an embodiment of the present invention;

Figure 17 illustrates a method of distributing, indexing and retrieving data in a distributed data retrieval system, according to an embodiment of the present invention;

Figure 18 illustrates the distribution of data information and the formation of sub-collections in a distributed data retrieval system, according to an embodiment of the present invention;

Figure 19 illustrates an inverted index from which a sub-collection view can be generated in a distributed data retrieval system, according to an embodiment of the present invention;

Figure 20 illustrates a sub-collection view, according to an embodiment of the present invention;

Figure 21 illustrates the paths of communication forming a network between a central computer and a series of local computers in a distributed data retrieval system, according to an embodiment of the present invention; and

Figure 22 illustrates a global view, according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

On-line computer services, such as the Internet, have grown immensely in popularity over the last decade. Typically, such an on-line computer service provides access to a hierarchically structured database where information within the database is accessible at a plurality of computer servers which are in communication via conventional telephone lines or T1 links, and a network backbone. For example, the Internet is a giant internetwork created originally by linking various research and defense networks (such as NSFnet, MILnet, and

CREN). Since the origin of the Internet, various other private and public networks have become attached to the Internet.

The structure of the Internet is a network backbone with networks branching off of the backbone. These branches, in turn, have networks branching off of them, and so on. Routers move information packets between network levels, and then from network to network, until the packet reaches the neighborhood of its destination. From the destination, the destination network's host directs the information packet to the appropriate terminal, or node. For a more detailed description of the structure and operation of the Internet, please refer to "The Internet Complete Reference," by Harley Hahn and Rick Stout, published by McGraw-Hill, 1994.

A user may access the Internet, for example, using a home personal computer (PC) equipped with a conventional modem. Special interface software is installed within the PC so that when the user wishes to access the Internet, a modem within the user's PC is automatically instructed to dial the telephone number associated with the local Internet host server. The user can then access information at any address accessible over the Internet. One well-known software interface, for example, is the Microsoft Internet Explorer (a species of HTTP Browser), developed by Microsoft.

Information exchanged over the Internet is often encoded in HyperText Mark-up Language (HTML) format. HTML encoding is a kind of markup language which is used to define document content information and other sites on the Internet. As is well known in the art, HTML is a set of conventions for marking portions of a document so that, when accessed by a parser, each portion appears with a distinctive format. The HTML indicates, or "tags," what portion of the document the text corresponds to (e.g., the title, header, body text, etc.), and the parser actually formats the document in the specified manner. An HTML document sometimes includes hyper-links which allow a user to move from document to document on the Internet. A hyper-link is an underlined or otherwise emphasized portion of text or

graphical image which, when clicked using a mouse, activates a software connection module which allows the users to jump between documents (i.e., within the same Internet site (address) or at other Internet sites). Hyper-links are well known in the art.

One popular computer on-line service is the Web which constitutes a subnetwork of on-line documents within the Internet. The Web includes graphics files in addition to text files and other information which can be accessed using a network browser which serves as a graphical interface between the on-line Web documents and the user. One such popular browser is the MOSAIC web browser (developed by the National Super Computer Agency (NSCA)). A web browser is a software interface which serves as a text and/or graphics link between the user's terminal and the Internet networked documents. Thus, a web browser allows the user to "visit" multiple web sites on the Internet.

Typically, a web site is defined by an Internet address which has an associated home page. Generally, multiple subdirectories can be accessed from a home page. While in a given home page, a user is typically given access only to subdirectories within the home page site; however, hyper-links allow a user to access other home pages, or subdirectories of other home pages, while remaining linked to the current home page in which the user is browsing.

Although the Internet, together with other on-line computer services, has been used widely as a means of sharing information amongst a plurality of users, current Internet browsers and other interfaces have suffered from a number of shortcomings. For example, the organization of information accessible through current Internet browsers and organizers such as Microsoft Internet Explorer or MOSAIC, may not be suitable for a number of desirable applications. In certain instances, a user may desire to access information predicated upon categories as opposed to by subject matter or keyword searches. In addition, present Internet organizers do not effectively integrate the categorical information in a consistent manner.

In addition, given the large volume of information available over the Internet, current systems may not be flexible enough to provide for organization and display of each of the kinds of information available over the Internet in a manner which is appropriate for the amount and kind of data to be displayed.

Figure 3 is a system overview in accordance with a preferred embodiment of the present invention. A plurality of user computers 3, 3a and 3b are coupled to a network 2. Network 2 is also coupled to another network 2a which itself is coupled to other computers (not shown). Computer 10 is also coupled to network 2. Coupled to computer 10 is database 1. Database 1 contains a plurality of records (not shown).

The network 2 may be a private or public network, an intranet or Internet, or a wide or local area network which not only connects the user 3 but other users 3a, 3b and other networks 2a to computer 10.

For ease of understanding, in the discussion which follows, the network 2 will comprise the Internet, though this need not be the case.

It should be understood that electronic product catalog 1 comprises a multiple-taxonomy, categorized electronic product catalog. In such an electronic product catalog the records have been tagged or otherwise categorized by more than one taxonomy. For example, the records in electronic product catalog 1 have been categorized by the taxonomies "Price," "Type," "Brands" and "Promotion." In this example, the records have also been categorized by additional "step search" taxonomies, but these taxonomies (such as "Color," "Style" and "Size" if the user has selected a clothing category, or "Monitor Size" and "Memory Amount" if the user has selected a computer category) are not presented as options until the user has drilled down to a specific category in the "Product Type" taxonomy.

In one embodiment of the invention, computer 10 receives search requests in the form of data (hereafter referred to as "search-related data") via network 2 from user computer 3.

Search-related data comprise a search term entered by a user to initiate a keyword search, or a taxonomy or category selected by the user by "clicking on" a portion of a screen.

The category and/or taxonomy selected by the user and sent to computer 10 is a way for the user to navigate a Web site. As such, the category will be referred to as a "navigational category" and the taxonomy will be referred to as a "navigational taxonomy."

For example, when the user accesses a web site, like web site 4000a or 4000b in Figure 4, he/she is presented with an initial screen which displays taxonomies 4001 and 4002, namely "Location" 4001 and "Products & Services" 4002. The user may then insert a search term 3001 and select a taxonomy 4002. After selecting a taxonomy, the user then selects a category 502.

Once computer 10 receives the search-related data, the present invention utilizes the navigational taxonomy 4002 and category 502 in the user's search request to determine sub-categories from the hierarchy associated with the navigational taxonomy and category.

For instance, if the category 502 comprises "Physician," then the process might yield sub-categories 503 shown in Figure 4000b. One such sub-category 503 is "Neurologists" 504. Sub-categories 503 will be referred to as "navigational sub-categories."

Once computer 10 has determined the sub-categories 503, it then can launch a search directed to database 1.

It will be appreciated that the present invention envisions computer 10 launching search queries aimed at database 1 using sub-categories 503 which are not selected by the user. Rather, these sub-categories are dynamically selected by computer 10 based on the taxonomies and/or categories input by the user.

According to one embodiment of the present invention, a search query may be carried out in a number of ways.

For example, in one illustrative embodiment of the present invention computer 10 launches a search query comprising a search term 3001, a taxonomy 4002 and sub-categories 503 directed to database 1. Computer 10 compares the navigational taxonomy and sub-categories 503 to the database taxonomies and sub-categories making up database 1. If a record is tagged with a database taxonomy and a sub-category which matches a navigational taxonomy and sub-category, then that record must contain characters which are responsive to the user's search. After a match is detected, computer 10 compares the search term 3001 against only those records having matching taxonomies/categories.

Once the matching records have been identified, computer 10 generates a numerical count of all of the records within database 1 which have a character string that matches the search term. This numerical count is further broken down by sub-category. For example, Figure 4 shows "428,935 Listings Found" for the category "Physician" 502. Within this, "77" relate to sub-category "Neurologist" 504.

In another embodiment of the invention, computer 10 launches a search query comprising only a category or sub-category without a search term. This enables a user to "drill-down" through database 1 merely by selecting a narrower and narrower sub-category. In yet another embodiment of the invention, computer 10 is adapted to launch search queries comprising only a search term or terms. It should be noted that computer 10 initiates any one of these types of search queries at any level of drill-down.

In an illustrative embodiment of the present invention, a user may also drill-up through a hierarchy of categories/sub-categories. For example, once a user has drilled down and reached the level represented by screen 4000b in Figure 4, he/she may click on the category "Healthcare Providers" 505, and upon receiving this category as search-related data, computer 10 returns to screen 4000 in Figure 4. In addition to drilling-up, the user 3 may switch taxonomies at any point in a drill-down or up. For example, the user can click on the

"Location" taxonomy 4001 in Figure 4 and be presented with categories corresponding to this taxonomy and all previous search constraints are maintained. In all cases, when the user clicks on or otherwise selects a taxonomy, category or sub-category, computer 10 compares the search-related data to a hierarchy as previously explained. A search is then launched by computer 10 using navigational sub-categories which result from this comparison.

Figures 5 and 6 provide display screens 5000 and 6000 depicting other examples of how results from a search using two or more taxonomies 5001, 5002 can be displayed. Beginning with Figure 5, there is shown an example of an initial screen 5000 which displays categories 505 which make up a "Products and Services" taxonomy 5002. Though only a few categories are shown, it should be understood that categories 505 may comprise any type of product or service, or some subset. In the example shown in Figure 5, the user types in a search term "neurology" 3002 and then clicks on the second "Location" taxonomy 5001. The present invention, however, is not limited to displaying the results of a search against only one taxonomy on one screen at the same time. Rather, the present invention can display the results of searches against multiple taxonomies on one screen at the same time.

Computer 10 then selects navigational sub-categories 506 which correspond to the "Location" taxonomy and subsequently launches a search query against database 1 using search term 3002, taxonomy 5001 and sub-categories 506. It should be noted that both taxonomies 5001, 5002 are provided to enable a user to initiate a search using either taxonomy.

Continuing, Figure 6 depicts an example of a screen 6000 generated from the results of initiating the just described search query. As shown, the screen 6000 displays categories 506 which are navigational sub-categories related to the "Location" taxonomy 5001. In addition, the number of records containing characters matching the search term "neurology" 3002 is also displayed. As before, this number is displayed as a total and is also broken down

for each sub-category. For example, next to the sub-category "Virginia" is the number "25,551" which indicates the number of records within database 1 that contain data or characters representing neurologists within Virginia.

It should be understood that the user need not input an additional keyword to further narrow his/her search. Instead, computer 10 generates intuitive sub-categories 506 which are presented to the user for the very purpose of narrowing his/her search. In addition, the number of matching records for each sub-category is displayed without the need for the user to individually launch separate searches aimed at each sub-category.

It should be understood that the terms "category" and "sub-category" are relative terms and in some instances may be used interchangeably.

The ability to switch among taxonomies, to drill-down or up, or to switch among taxonomies while drilling down or up enables the user to navigate a Web site and corresponding database 1 with great ease. This ease-of-navigation can be used to enable new revenue models. In one embodiment of the invention, new revenue models, such as advertising models, are enabled from such easy-to-navigate Web sites.

Taxonomies and categories/sub-categories can be analogized to aisles and shelves in a grocery store. A user finds the shelf ("category") he/she is interested in somewhere in an aisle ("taxonomy") comprised of multiple shelves. In brick-and-mortar grocery stores (i.e., physical, not Internet stores), companies have sought to catch the eye of a shopper as he/she scans a shelf by placing advertisements next to their product. Ideally, the shopper will notice the ad and be enticed to buy the product over other similar items on the same shelf that have no advertisement associated with them. The present invention envisions the enabling of new advertising revenue models based on the selection of aisles and shelves (i.e., taxonomies and categories).

Figure 7 depicts an advertisement 7000 generated when a user selects the category "Health Insurance & Information" 7004 in the "Products and Services" taxonomy 7002. Using the aisle and shelf analogy again, the user first selects the "Products and Services" aisle, scans the aisle and determines that he/she is interested in those shelves associated with "Health Insurance & Information," selects those shelves and is presented with a list of shelves which are related to "Health Insurance & Information." The user can then select the specific shelf or sub-category 7003 which he/she is interested in. Unlike a physical grocery store, the "aisle" that the user has "walked" down is actually two aisles. All of the products on the shelf have been organized by "Location" and by "Health Insurance & Information." Thus, as the user "stands" in front of the shelf associated with "Health Insurance & Information," he/she is also "standing" in front of a shelf which is also associated with some subset of the "Health Insurance & Information" aisle. In the physical world, it is as if each end of an aisle has two signs, one labeled "Location" and another labeled "Health Insurance & Information." Down the aisle are categories of items which are associated with a specific location or locations and particular products and services.

In one embodiment of the invention, computer 10 selects advertisement 7000, based on the taxonomies, categories and/or search terms input by a user, in this case, based on the user's selection of the category "Health Insurance & Information" 7004. The selection of such an advertisement will be referred to as "attaching" an advertisement based on the search-related data input.

Computer 10 attaches advertisement 7000 only when a user selects the category "Health Insurance & Information" 7004 for example. More generally, computer 10 attaches advertisements based on real-time, instantaneous actions (e.g., selection of a taxonomy or category) received from the user. It should be understood that any type of advertisement may be attached by computer 10 in response to search-related data supplied by the user. The

search-related data supplied by user begins as preferences in the mind of the user. As the user navigates through a Web site he/she makes choices based on those preferences. These choices are manifested in the taxonomies, categories, sub-categories and search terms selected or otherwise input by the user.

Computer 10 also attaches an advertisement at any point during a drill-down or up, when a user switches taxonomies, and/or upon the input of a search term.

The ability to attach advertisements based on real-time preferences of a user is useful. In particular, this capability allows on-line publishers to use new models to generate revenue. Publishers will no longer need to rely on a circulation rate model. Instead of selling on-line advertisements based solely on historical, circulation-related criteria, advertisers can establish revenue models based on real-time user preferences. In one illustrative embodiment of the invention, publishers can charge different dollar amounts by category level. For example, a publisher may create a multi-tiered advertising rate structure. Such a model may comprise a first or lower tier and subsequent higher tiers. In an illustrative embodiment of the invention, the lower tier may comprise a relatively low dollar amount with each subsequent higher tier comprising an increased dollar amount. In addition to linking each tier to a dollar amount, computer 10 links each tier or tiers to a category level. For instance, the category "Health Insurance & Information" 7004 may represent one category level while the "Location" taxonomy 7002 may represent another. In an illustrative embodiment of the invention, computer 10 links each of the levels to a dollar amount. So, one level may be linked to a low dollar amount while another level may be linked to a higher dollar amount.

A publisher may generate revenue from such a model as follows. If a business wants its advertisement to be seen whenever a user is attempting to locate a pharmacy, a publisher may charge a fee of $1.00. Each time a user selects the "Location" taxonomy 7002 the user would see an ad corresponding to this search level. If, however, a business only wants to

advertise when a user needs a retail pharmacist, then the publisher may charge a higher amount, say $2.00 to allow ad 7000 to be displayed when a user clicks on the category "health Insurance & Information" 7004. In one embodiment of the invention, computer 10 attaches ads to categories located farther down a hierarchy for a higher cost than ads closer to the beginning of the hierarchy. The rationale behind such an advertising model is that businesses are willing to pay higher advertising rates to reach those users who are engaged in focused searches. In an alternative embodiment, higher rates are applied at higher categories because more people view these categories than individual sub-categories. As can be imagined, any number of models can be created. These include, but are not limited to, the following: a model where computer 10 attaches ads to categories located farther down a hierarchy for a higher cost than categories at the beginning of the hierarchy; or a model where computer 10 attaches ads for a premium cost to categories within a hierarchy. In these models, the advertising rate was determined by the breadth or "direction" of the search, i.e., drilling up or drilling down. In another model, the advertising rate is based on the popularity of the category or on the uniqueness of the category.

Figure 8 depicts screen 8001 generated in accordance with an alternative embodiment of the present invention. In this embodiment, computer 10 generates advertisements 8001 when the user initiates a search which includes a search term which matches a term used within ad 8001.

For purposes of explaining Figure 8, it is assumed that the user has drilled down using a "Products and Services" taxonomy and category "Hospital." Upon clicking on the "Hospital" category, advertisement 8001 is displayed. The ad 8001 does not comprise a "banner" advertisement, such as ad 7000 in Figure 7. Instead, it is a "display" advertisement for a particular business, in this case a hospital. In an illustrative embodiment of the invention, computer 10 attaches an advertisement when the search initiated by the user

contains a character-string which matches a character-string in the advertisement. In Figure 8, the advertisement 8001 is attached because it contained the word "neurology" which is also the search term 3002 from Figure 5. This is a form of syndicating an advertisement from a merchant to a user. The present invention allows the merchant to build his/her advertisement in any format and have it distributed. Thus, the present invention acts as a collector and syndicator of data.

Real-time user preferences are manifested in the taxonomies, categories and search terms selected or otherwise inputted into a Web site. As illustrated above, these stored preferences can be used to focus a search by selecting intuitive, navigational sub-categories from a hierarchy of categories/sub-categories. These preferences also trigger the display of ads which are tailored to the users' preferences or at least to the perceived preferences of such a user.

These real-time preferences can be used in other ways envisioned by the present invention, as well. For example, the present invention envisions computer 10 tracing user preferences. This tracing is done in near real-time and allows a business to follow a user as he/she works her way through a website using taxonomies and a hierarchy of categories. In an additional embodiment of the invention, computer 10 stores the taxonomies and categories selected by a user to determine, for example, the products and services preferred by the user. From this, a business can determine to which category or taxonomy within the data collection hierarchy their ads should be attached.

Figure 9 provides a schematic of the data as it is stored and organized in a database in accordance with a preferred embodiment of the present invention. The database 905 contains many records, 905a, 905b, and 905c. In this example, a record is a single unit of identifiable data. Examples of records include individual Web pages, text documents, collections of

video, still image, audio data, or any combination of these. It should be noted that there are other types of data that may be grouped together to form a record.

Three exemplary records are shown in Figure 9. Record 905a is a plain text document. Contained within this record is a word such as "tires." A record such as this could be an HTML page (or XML document or database record) attached to a service station's main home page. Once a user has accessed the home page, he/she would click on a link to access this text document to learn what services this station provides.

Record 905b is a home Web page used to advertise a tire store and Record 905c is a home Web page used to advertise a physician's clinic. As shown, Record 905c includes text giving a description of the services provided by the clinic and a graphics interface format (GIF) file that is a map providing details on how to get to the clinic.

Indices/databases 910, 915a and 915b are used to access records in database 905. Inverted index 902 contains a listing of all the key words and phrases 910 in all of the records in database 905, and other indices 915a and 915b. Examples of such key words and phrases include "tires," "batteries," "safety inspection," "allergies," "broken bones" and "family medicine." Attached to each of these key words and phrases are links 910b. These links reference each record in index/database 905 that contains these words and phrases.

Indices/databases 915a and 915b represent different taxonomies of database 905. As shown by the headings, index/database 915a is a "Product/Service" taxonomy of database 905 and index/database 915b is a "Location" taxonomy of database 905.

These three indices/databases 910, 915a and 915b are used to access the records in database 905 in three different ways. Index/database 910 receives search terms or phrases and is scanned to locate those key word or phrases. When a hit is discovered, the number of links 910b that reference into database 905 is then determined.

Indices/databases 915a and 915b provide data collection lists of their respective contents in response to user input. As an example, if the user clicks on the "Products/Services" taxonomy, all of the categories within that taxonomy are displayed. Two of those categories include "Physicians" and "Automotive." As shown in Figure 9, each of these categories is divided into sub-categories like "New Car Sales," "Used Car Sales," "Service," "Allergists," "Cardiologists" and "Radiologists."

Index/database 915b is a taxonomy of database 905 based on "Location." Within taxonomy 915b are categories. An easy example is a listing of states or countries. Each state is sub-categorized by county.

By having multiple taxonomies of the single database, multiple paths are possible to reach the same records. Figure 10 shows one set of queries from a user and the system responses that represent a path a user may take to reach the records he/she desires. The user begins by typing in a search term against the "Products and Services" taxonomy. In the example given the search term is "tire." The present invention queries term index 910 and determines that 36,653 records in the database have the word "tire" within them.

The present invention then determines the categories that are associated with the search term "tire". For example, almost all of the records that have the search term "tire" in them are categorized into the group of "Automotive." The user selects the "Automotive" sub-category and the present invention then searches through index 915a to determine how many records within each of the sub-categories also are associated with the search term "tire." As shown in Figure 10, only 254 records organized into the "Automobile Dealers" category contain the keyword "tire" while 13,887 records organized into the "Automobile Parts & Supplies" category contain the keyword "tire." Thus the present invention compounds all of this data and provides it to the user. It should be noted that by pushing data back to the user,

in this case a glimpse of the organization of the categories, the user can learn how best to proceed with drilling down into the data.

The user responds to the list of sub-categories provided by the present invention by selecting one. In this example, the user selects the sub-category "Automobile Parts & Supplies".

The system responds by providing a list of all 13,887 listings that are associated with the search term "tire." This list is unruly for a human being to wade through so the user clicks on the "Location" taxonomy in response.

The system responds by cross-matching the 13,887 records against the categories within the "Location" taxonomy. Thus, the system generates a directory of these 13,887 records as organized by state (i.e., Virginia has 303, etc.).

The user responds to these sub-categories by selecting a particular state, say Virginia. The system responds by cross-matching the sub-categories within Virginia. In this example, the sub-categories are the various counties and city municipalities within Virginia. Once the cross-matching is completed, the system provides the user with a list of appropriate sub-categories with how many records match the search so far.

The user responds by selecting the sub-category "Service." The system responds by providing a list of all of the records that match the search. The user refines the search via the "Location" taxonomy. Thus, the user selects the "Location" taxonomy and the system responds by cross-matching the records associated with the sub-category "Service" with the categories of the "Location" taxonomy (i.e., cities or counties in Virginia). The system then displays the listing of categories with the number of records associated with the sub-category "Service" and each city or county in Virginia.

Thus, the system responds by listing the sub-categories under the category "Virginia" (i.e., "Alexandria," "Fairfax County," "Arlington County, " etc.) with the number of records associated with "Service" in parentheses.

The user selects a listed sub-category. Following the above example, the user selects "Alexandria." The system responds by listing all of the "Service" associated records that are also associated with "Alexandria" in "Virginia."

The user responds by entering the search term "tires." The system receives this query, matches records associated with the search term "tires" from free-text term index against the terms stored therein and cross-matches those records associated with the search term "tires" with the listed records. This produces a list of 15 records that match the search. In this example, the listed records match the taxonomy "Location;" the category "Virginia;" the taxonomy "Products and Services;" the category "Automotive;" the sub-category "Service;" the taxonomy "Location;" the category "Virginia;" the sub-category "Alexandria" and the search term "tires."

These three examples demonstrate the versatility of the present invention. First, the user is not required to go through a specific path to reach the desired number of records. While the above examples show only three paths to reach the desired set of records, it can be appreciated that there are multiple paths to reaching the same set of records.

This plurality of paths is achieved by the independence of the taxonomies shown in Figure 9. By keeping these taxonomies independent, the user may switch between which taxonomy he/she wishes to use to consider the data and make queries into electronic product catalog 905. The level of the search that the user uses to make a decision to switch among taxonomies is also arbitrary and up to the user, with the exception of any "step search" taxonomies that have not yet been presented as options at that stage of the search. This allows users who are more proficient in developing searches to use their proficiency in one

taxonomy index to whittle the number of electronic records down before going into another taxonomy index to finish the search where the user is less proficient, and vice versa.

Another feature of the present invention is the pushing of data to the user. As noted above, the user receives category and sub-category information when a query via a search term is used earlier in the process. As noted above, suppose the user is looking for "rims" for his/her car, instead of tires. By typing the search term "rims," the system will provide the category list to the user so that he/she can drill down into the data. Thus, if there were a sub-sub-category of "tires" the user would eventually see that sub-sub-category and make the association between "tires" and "rims." Thus the user comes in contact with a useful category or sub-category that he/she can use to search for desired information.

The present invention is also useful as a new method of doing business. More specifically, the present invention may be used to advertise items in the database for merchants or manufacturers. In this business model, a plurality of merchants submits records that advertise their stores, goods and services. Such a record could simply be a copy of a Web page that includes the merchant's line of business, address, phone number, a map showing the location of the store, hours of operation and a picture of the storefront. It should be noted that this example is not limited to physical stores, but may also be implemented using virtual stores. Additionally the character string search permits a user to receive information directly from a merchant or manufacturer.

These records are categorized so that associations are made between the categories and sub-categories in the multiple taxonomies and the records. In addition, terms within the records that correspond to terms in the free text term index are determined. Associations are then made between these records and the various categories and terms in the indices.

These records act as searchable storefronts for the merchants. Since the records or storefronts are categorized, a consumer may use the organization of the categories to locate

specific merchants. As an example, assume a consumer was trying to locate a pharmacist to fill a prescription. The consumer would select the "Products and Services" taxonomy. The system responds by providing the list of categories and numbers of records associated to each category. One of these categories is "Healthcare" which the consumer then selects. The system responds by displaying all of the sub-categories of "Healthcare" such as "Allergists," "Family Medicine," "Pharmacists" and "Podiatrists."

The user then selects the sub-category "Pharmacists." This sub-category is the end of the categorization in this example. Therefore, the system displays a hit list of all records that are associated with "Pharmacists." If the database is large, there could be thousands of records in this sub-category. To put a number on it, this exemplary database has 24,346 records associated with "Pharmacists."

The consumer will then want to limit the number of hits by viewing the records associated with the sub-category "Pharmacists." He/she does this by drilling across to the "Location" taxonomy, which instantly reorganizes all 24,346 records into geographic categories. By selecting the category "Virginia" and the sub-category "Fairfax County" the consumer will limit the records to just those pharmacists in Fairfax County, Virginia.

The consumer has used the records or virtual storefronts to peruse the vast number of merchant offerings to find the merchant or merchants who can best suit his/her needs. This is advantageous to the consumer in that he/she does not need to drive around the neighborhood looking at signs and physical storefronts to learn what each business is selling. In addition, these advertisements may be pushed to users based on a given search criteria as previously described in the description of Figure 8.

This system also has advantages to the merchants. Suppose a merchant does not want to incur the costs of maintaining a Web site. Maintaining a Web site also requires that the merchant be assured that various search engines can locate his Web site and allow the

consumers to access it. In other words, a Web site that cannot be located will not lead many consumers to the store.

In this embodiment, a merchant or user may spend a small fee to submit the virtual storefront/record and avoid the costs of maintaining a Web site. In addition, by virtue of the searchability of the text of the record/virtual storefront, the merchant is assured that the record/virtual storefront is locatable.

Another advantage of the present invention is the way results are provided to the user. As noted in the many examples above, much of the sifting through the database is done via the categories and sub-categories. In a preferred embodiment, there are many more records in the database than there are categories. As an example, a search term may be associated with thousands of records, but only one category. Providing a list of thousands of records requires a lot of data handling in both the transmission of the data to the user, as well as the displaying of the data to the user. Providing a list of only one category is much less data to transmit and display. This makes the invention ideal for use with devices with small screens, such as cell phones, pagers, and personal digital assistants (PDAs) and palm-held devices.

Figure 16 is a representation of a portion of the data stored in structure 902 and how that data is organized in accordance with a preferred embodiment of the present invention. Node 1605 represents the category "Virginia" from the "Location" taxonomy. Node 1610 represents the sub-category "Arlington." Node 1615 represents the sub-category "Fairfax." Node 1620 represents the sub-category "Service" from the "Products and Services" taxonomy. Record 1625 represents a single record.

Linking the nodes and records are category code words. Category information is stored in the inverted index as an encoded category codeword. Leading into node 1605 is a category code word called "VA." Leading into node 1610 is a category code word called "AR." Leading into node 1615 is category code word "FX." Leading into Record 1625 are

links R1 and R2. This representation shows how the various categories relate to each other and the records.

In one embodiment of the present invention, these path names are stored in inverted index 902 and used to retrieve electronic records. This structure provides several advantages. In one embodiment of the present invention, these path names are stored in inverted index 902 and used to retrieve electronic records. This structure provides a means to perform Boolean operations on the path names to calculate category count results and to identify records that are identified by those category paths.

It will be appreciated that large global collections of data can be broken down into smaller sub-collections. The sub-collections can be stored independently one from the other, as in separate physical locations or simply in separate data tables within the same physical location, and can be connected one to the other through a network or stored locally. As data are added to the large global collection overall, it can be sent and added to individual sub-collections and/or can be formed into a further sub-collection. For instance, data entered by educational institutions and scientific research facilities can be stored independently in their own data storage facilities and connected to one another via a network, such as the Internet. Thus, as can be seen, the present invention can be implemented with very little or no change in the present protocol for data collection and storage.

It will be appreciated that the present invention provides a search interface that can aggregate disparate databases and make the disparate databases searchable through one interface.

Once the individual sub-collections have been identified, each performs its own indexing function. In carrying out the indexing function, each sub-collection creates its own sub-collection taxonomy consisting of statistical information generated from what is commonly referred to as an inverted index. An inverted index is an index by individual words

listing electronic records which contain each individual word. The indexing function itself can be carried out in any method. For example, indexing can be performed by assigning a weight to each word contained in a document. From the weights assigned to the words in each document, a sub-collection view (i.e., the statistical information derived from the inverted index) is created upon completion of the indexing function. Regardless of how the sub-collection indexing is carried out, each sub-collection will have its own independent sub-collection view based upon that sub-collection's inverted index. When data information is added to the sub-collection, the indexing function is carried out again and the sub-collection's view can be re-compiled from a new inverted index.

Upon completion of each sub-collection view, certain statistical information about the sub-collection view is gathered by a global collection manager to form a global collection of parameters, statistics, or information. The global collection manager may either request from each sub-collection that it send its sub-collection view, and/or each of the sub-collections may spontaneously send the sub-collection view to the global collection manager upon completion. Regardless of whether the taxonomies are requested or spontaneously sent, upon collection at the global collection manager of all of the sub-collection's views, the global collection manager builds a "global view" on the basis of the sub-collection views. Necessarily, the global view is likely to be different from each of the individual sub-collection views. Once the global view has been compiled, it is sent back to each of the sub-collections.

In this manner then, a distributed data retrieval system is built and is ready for search and retrieval operations. To search for a particular piece of data information, a system user simply enters a search query. The search query is passed to each individual sub-collection and used by each individual sub-collection to perform a search function. In performing the search function, each sub-collection uses the global view to determine search results. In this manner

then, search results across each of the sub-collections will be based upon the same search criteria (i.e., the global view).

The results of the search function are passed by each individual sub-collection to the global collection manager, or the computer which initiated the search, and merged into a final global search result. The final global search result can then be presented to the system user as a complete search of all data information references.

The labeling of these paths also reduces computation time for other searches. For example, if the search is a proximity search (i.e., Is store X within 5 miles of apartment Y?), the present invention can be used to make this determination. For example, if in one path to the record associated with store X is the path name "SC" for South Carolina and in the corresponding path to the record apartment Y is the path name "MD" for Maryland, the system can immediately determine that the answer to this query is No by merely referring to the path names.

It should be noted that other variations are possible with this embodiment of the invention without departing from the scope of the invention. For example, the number of characters used to describe a category is not limited to two and may in fact be any number of characters. Additionally, the category code words need not be limited to letters but may encompass numbers, symbols or a combination of letters, numbers and symbols. In addition, once the category code words between the base node and each record are determined, they may be stored within the records as tags in a preferred embodiment of the present invention.

Figure 13 shows a system overview in accordance with an embodiment of the present invention. Hub computer 505 is the central point. It receives queries from and provides compiled results to users. Hub computer 505 is comprised of front end 505a, back end 505b, microprocessor 505c and cache memory 505d. Front end 505a is used to receive queries from users and format the results so that they are in a compatible format for the user to understand.

Back end 505b uses the appropriate protocols to issue broadcast messages and receive messages. Coupled to hub computer 505 are spoke computers 510a, 510b p through 501n. Spoke computers 510a-510n have local memories 510a1-510n1 that are used to store indices. Coupled to each spoke computer 510a-510n is large memory storage 515a-515n used to store the records in database 905.

In a preferred embodiment of the present invention, hub computer 505 and spoke computers 510a-510n are Intel-based machines. The communications between the hub computer 505 and spoke computers 510a-510n are based on the TCP/IP format. Spoke computers 510a-510n operate using a standard database language, such as SQL. Hub computer 505 uses Visual Basic and C++ to process data.

Figures 17 through 22 show a method and an apparatus for the efficient and effective distribution, storage, indexing and retrieval of data information in a distributed data retrieval system which is fault tolerant. Large amounts of data may be searched and retrieved faster by distribution of the data, separate indexing of that distributed data, and creation of a global index on the basis of the separate indexes. A method and apparatus for accomplishing efficient and effective distributed information management will thus be shown below.

Referring to Figures 17 and 18, in step 100 of Figure 17 data information is distributed and formulated into sub-collections 150 of Figure 17. The process of distributing the data may be accomplished by sending the data from a central computer terminus 110 to local nodes 120, 130 and 140 of a computer network 10, or by directly entering the data at the local nodes 120, 130 and 140. Further, the data may be divided such that the divided data is of equal or unequal sizes, and so that each division of the data has a relational basis within that division (i.e., each division having an informational subject relation all its own). Such allowances for data entry and distribution allow for little or no change to current data entry and distribution protocols. In the case of the Web, data entry can continue as it does now.

Each entity (i.e., Universities, Medical Research Facilities, Government Agencies, etc.) can continue to enter data as it sees fit. Thus, the sub-collections 150 can be organized in any fashion and be of any size.

In step 200 of Figure 17, the data information, which has been divided and stored into the sub-collections 150, is indexed and a "sub-collection view" is formed. Indexing of the sub-collection 150, like the step of distributing the data, can follow current protocols and may be computer-assisted or manually accomplished. It is to be understood, of course, that the present invention is not to be limited to a particular indexing technique or type of technique. For instance, the data may be subjected to a process of "tokenization". That is, electronic records containing the data are broken down into their constituent words. The resulting collection of words of each document is then subject to "stop-word removal", the removal of all function words such as "the", "of" and "an", as they are deemed useless for document retrieval. The remaining words are then subject to the process of "stemming". That is, various morphological forms of a word are condensed, or stemmed, to their root form (also called a "stem"). For example, all of the words "running", "run", "runner", "runs", . . . , etc., are stemmed to their base form run. Once all of the words in the document have been stemmed, each word can be assigned a numeric importance, or "weight". If a word occurs many times in the document, it is given a high importance. But if a document is long, all of its words get low importance. The culmination of the above steps of indexing convert a document into a list of weighted words or stems. These lists of weighted words or stems are thus in the form:

document.sub.1 .fwdarw.word.sub.1, weight.sub.1 ; word.sub.2, weight.sub.2 ; . . . ; word.sub.n, weight.sub.n.

Regardless of the indexing technique used, the index thus far created is then inverted and stored as an "inverted index", as shown in Figure 19. Inversion of the index requires pulling each word or stem out of each of the documents of the index and creating an index

based on the frequency of appearance of the words or stems in those documents. A weight is then assigned to each document on the basis of this frequency. Thus, the inverted index, has the form of:

word.sub.i .fwdarw.document.sub.a, weight.sub.a ; document.sub.b, weight.sub.b ; . . . ; document.sub.z, weight.sub.z.

The inverted index 210 itself, as shown in Figure 18, is composed of many inverted word indexes 220, 230 and 240, and can thus be created and organized. As shown, each inverted word index 220, 230 and 240 composes an index of a different word, taken from the documents of the initial index, such that each document is weighted in accordance with the frequency of appearance of the word in that document. Completion of the inverted index 210 allows the derivation of statistical information relating to each word and thus the creation of a sub-collection view 410, as shown in Figure 19. The statistical information which makes up the sub-collection view 410 includes the total number of documents in the sub-collection 150 and, relating to each word, the number of documents in the sub-collection that contain that word. As each computer is indexing its sub-collection separately, the total indexing time for indexing the entire collection is greatly reduced as it is now shared across many computers. It is to be understood, of course, that any method of indexing may be used to form the sub-collection view 410 and that the above described method is but one of many for accomplishing that goal.

In step 300 in Figure 17, once the sub-collection view 410 is created, a global view is created and distributed. For formation of the global view, each sub-collection view 410 which has been created is collected from the local nodes 120, 130 and 140 of the computer network 10 and sent to the central computer 110. Referring to Figure 21, showing an embodiment of the paths of communication of a computer network 20, sub-collection views from computers 320, 330 and 340 are sent to central computer 310 along communication paths 4.1. Collection

and sending of the sub-collection view can be initiated by either the central computer 310 or the local computers 320, 330 and 340. If collection of the sub-collection views 410 is initiated by the central computer 310, it may be initiated by individual commands sent to each computer in the network 20, or as a group command sent to all of the computers in the network 20. If the collection of the sub-collection views 410 is initiated by the local computer 320, 330 or 340, then the local computer may send the sub-collection view upon occurrence of completion of the sub-collection view, an update of the sub-collection view, or some other criteria, such as a specific time period having elapsed, etc. It is to be understood, of course, that any method by which the completed sub-collection views are sent to the central computer from the local computers is acceptable.

Upon collection of all of the sub-collection views 410, a global view 510 is created as shown in Figure 22. In the formation of the global view 510, the central computer 310 uses the sub-collections 410 that have been sent from every local computer 320, 330 and 340 to determine how many electronic records are contained in the sub-collection residing at the particular local computer, and for every word, how many electronic records in the sub-collection contain the word in question. The global view 510 then comprises information pertaining to how many electronic records there are in all of the sub-collections (i.e., the total document sum) and for every word, how many electronic records in all of the sub-collections contain the word in question. The global view, then, provides all of the necessary information for use in weighting the words in a user query, as will be explained below. It is to be understood, of course, that any method which provides the central computer with the information necessary to form the global view may be used. For instance, the sub-collection views need not be sent in their entirety themselves, but instead the nodes could send only statistical information about their subcollection(s).

To complete step 300 of Figure 17, the global view 510 is sent from the central computer 310 to each of the local computers 320, 330 and 340 by way of communication paths 4.2 (as shown in Figure 21). Thus each local node in the network will now have the global view. It is to be understood, of course, that the description of the formation of the sub-collection views and subsequent formation of the global view can be conducted on any computer network, and thus computer networks 10 and 20 are to be considered interchangeable in this description.

In step 400 of Figure 17, the search phase is conducted. The search phase refers to search and retrieval of data information stored in the large data text corpora. Thus, to begin with, in the search phase a search query is entered and uploaded by a system user into the computer network 10. It is to be understood, of course, that the system user may enter the search query at any computer location that is connected to the computer network 10. Upon entry of the search query, the search query is transmitted by the computer network 10 to all of the local computers 120, 130 and 140 in the computer network 10.

After receiving the search query, each local computer 120, 130 and 140 then indexes the search query using the same steps that are used to index the documents, namely, for instance, "tokenization", "stop word removal" and "stemming" and "weighting". The resulting words (actually stems) in the query are assigned importance weights using the global view 510 which each local computer 120, 130 and 140 received in step 300. If a query word is used in many documents, then it is presumed to be common and is assigned a low importance weight. However, if a handful of documents use a query word, it is considered uncommon and is assigned a high importance weight. The "total number of documents in the collection" and the "number of documents that use the given word" statistics are only available to local computers 120, 130 and 140 after the global view creation.

It is to be noted, of course, that other formulae might be used as desired. If so, the sub-collection view may be adjusted to account for the different formula. It should also be noted that having each local computer perform an indexing of the search query might be necessary if the entry point of the search query is at a point which does not have access to the global view and thus cannot perform the indexing function. However, if the entry point for the search query does have access to the global view, then the search query can be indexed at the entry point and distributed in an indexed format.

The indexing of the search query, as shown above, yields a weighted vector for the search query of the form:

query.fwdarw.word.sub.1, weight.sub.1 ; word.sub.2, weight.sub.2 ; . . . ; word.sub.n, weight.sub.n.

Having indexed the search query, a simple formula is used to assign a numeric score to every document retrieved in response to the search query. A formula, referred to as a "vector inner-product similarity" formula can assign a weight to a word in the search query and another weight to a word in the document being scored. Each document is then sent to the central computer 310, via communication paths 4.1, from the local computer nodes 320, 330 and 340.

In step 500 of Figure 17, once all search results have been returned to the central computer via communication paths 4.1, the central computer 310 merges the variously retrieved documents into a list by comparing the numeric scores for each of the documents. The scores can simply be compared one against the other and merged into a single list of retrieved documents because each of the local computers 320, 330 and 340 used the same global view 510 for their search process. Upon completion of the merging of the documents, a complete list is presented to the system user. How many of the documents are returned to the user can, of course, be pre-set according to user or system criteria. In this manner then, only

the documents most likely to be useful, determined as a result of the system user's search query entered, are presented to the system user.

It should be noted that the manner in which the global view 510 is created provides a fault tolerant method of distributing, indexing and retrieving of data information in the distributed data retrieval system. That is, in the case where one or more of the sub-collection views is unable to be collected by the central computer, for whatever reason, a search and retrieval operation can still be conducted by the user. Only a small portion of the entire collection is not searched and retrieved. This is because failure by one or more local computers results in only the loss of the sub-collections associated with those computers. The rest of the data text corpora collection is still searchable as it resides on different computers.

Further, to provide even more fault tolerance, data information may be duplicatively stored in more than one sub-collection. Duplicative storage of the data information will protect against not including that data information in a search and retrieval operation if one of the sub-collections in which the data information is stored is unable to participate in the search and retrieval.

Thus the foregoing embodiment of the method and apparatus show that efficient and effective management of distributed information can be accomplished. The current invention of the division of the large data text corpora into sub-collections which are then separately indexed, which indexes are then used to form a global view, is possible, as shown herein, without a loss and, in fact, an increase in the effectiveness and efficiency of a search and retrieve system. Further, the search and retrieval operations take less time than current systems which either search the entire large collection all at once or which search individual collections.

This system implements the search queries described above in the following manner. First, hub computer 505 receives a query from the user. This query can be in the form of a

search term, a taxonomy selection, a category selection, a sub-category selection, etc. Upon reception of the query, microprocessor 505c compares the query with data stored in cache 505d. If the response to the query is already stored in cache 505d, the microprocessor 505c returns that response as a result to the user. Hub computer 505 then waits for another query from the user.

If the query is not in cache 505d, microprocessor generates a broadcast message to be sent to all spoke computers 510a-510n. This broadcast message includes the user's query.

Upon reception, each spoke computer 510a-510n performs a search of the appropriate index stored therein using the query from the user. In a preferred embodiment of the present invention, each spoke computer 510a-510n stores all three indices 910, 915a and 915b in local memory as described above. In addition to broadcasting a request across the network to different machines, multiple threads could be used and the message could be broadcast to multiple processors in a single machine (on a bus rather than a network). Alternatively, the search request could be conducted locally -- a single process, single thread, single machine search.

Also in the preferred embodiment, data storage 515a-515n each stores only a portion of the records in database 905. Since each set of data is unique in data storage 515a-515n, it follows that the relationships between the indices stored in local memories 510a1-510n1 are also unique because they cannot all access the same records. In an alternate embodiment, spoke computers 515a-515n all share identical copies of database 905, but the indices/databases 910, 915a, and 915b are parsed among local memory 510a-510n.

Each spoke computer 510a-510n returns the results, either a list or the counts for each category, determined by its respective indices to hub computer 505. Hub computer 505 compiles those results and provides them to the user. In an alternate embodiment, spoke

computers 515a-515n are also provided with cache memories to reduce the number of queries made to memories 515a-515n.

In another preferred embodiment of the present invention, the system and method of the present invention can be performed locally using a single process, single thread, single machine system.

Figure 14 is a system in accordance with the present invention. At block B1405, the system receives a query from the user. It should be noted that the query may be a term, a taxonomy, a category, a sub-category, a sub-sub-category, free text, a field, a numeric range, Boolean logic, combinations of elements, etc. At block B1410, the query is formulated with respect to the current state of the present search. As an example, if the user enters the keyword "neurology," the query is formulated such that the current taxonomy is taken into consideration (i.e., "Location").

At block B1415, the system determines the appropriate categories or sub-categories to search through to locate records that match. As an example, one possible category is "Physicians." From the determinations made in blocks B1410 and B1415, the system has narrowed the number of possible hits by discarding those records that do not conform to the selected category. It should be noted that, in a preferred embodiment, the categories or sub-categories are determined using an organized list such as a B-tree, another database or from the inverted index itself.

At block B1420, the system checks its cache. The cache typically stores three types of data. The first type of data is a query result that was recently performed. Thus if user A issues a query for term X in category Y, and 1 minute later user B makes the identical query, the cache is used to provide the results, instead of determining the results anew. The second type of data stored in the cache is frequently requested queries. Suppose users are, in the aggregate, frequently requesting records on new cars but not requesting records on the disease

malaria. The results from this frequently requested query are then stored in the cache. The third type of data is searches that are precompiled because otherwise they would take a long time to perform.

If the query is not in the cache, then the query is broadcast to a plurality of processors operating in parallel at block B1425. It should be noted that blocks B1420 and B1425 are in dashed lines because they are not requirements of the process in order to be operational, but rather are preferred embodiments that enhance the performance of the process. To be more specific, if the query is found in the cache, then blocks B1430-B1440 are eliminated and the overall time to provide the user with results is reduced. The use of parallel processors operating on either portions of the query or searching only portions of the inverted index also reduces the amount of time it takes to provide a result. Thus, a slower performing system that did not include a cache or parallel processors could also use the present process to generate results.

At block B1430, the system receives the number of records that "hit" on the query provided in block B1405. At block B1435, the hits are compiled and the number of hits per category, as determined in block B1415, is also compiled.

At block B1440, the results are displayed to the user. Typically, these results are organized into categories. However, in a preferred embodiment, the system will display a default list of record hits when there are no sub-categories below the last category selected by the user. This prevents giving the user a listing of categories with 0 record hits because this information is not as useful to the user as to know which category the record hits are located in.

At block B1445, a determination is made based upon the results displayed. If the user is satisfied with the results, the process ends at block B1450. If the user desires to refine the

query or drill-down or drill-up further into the database, the process continues with a new query at block B1405.

Figure 15 is a screen shot of a categorizer in accordance with an embodiment of the present invention. This embodiment of a categorizer is a graphic user interface (GUI) that a system operator uses to assist in associating records with categories. Typically, the system operator uses this embodiment of the present invention to insert a new record into an existing category in the taxonomy. Section 1505 is a toolbar that provides such functionality as editing, searching within a record, changing the viewed record, printing, etc. Section 1510 is a graphic representation of the categories in the taxonomy. Section 1515 is a display of the current record.

The system operator scrolls through the taxonomy in section 1510 and the record in section 1515 looking for the best-fit categories for the record displayed in section 1515. When the system operator believes he/she has found a best-fit category for the displayed record, he/she instructs the system to make an association between the best-fit category and the displayed record by clicking button 1520.

In a preferred embodiment of the present invention, the record is scanned by the system before it is displayed. This scanning procedure compares the key terms stored in 910 with the word in the record. When a match is made, the record is highlighted so that the system operator may quickly discern which key terms are in that record. In addition, a count is performed on how many key terms are in this record. The system then queries the various category indices looking for a category title that matches the key term with the most hits in the record. Once that category is determined, that category is displayed along with its parent categories and its sub-categories so as to provide a frame of reference for the system operator. If the system operator agrees with the automatically determined category, he/she clicks on button 1520 to create an association between that determined category and the displayed

record. If the system operator does not agree with suggested category and cannot find another suitable category by searching through the list of categories, he/she clicks on button 1525 to instruct the system to create a new category into the hierarchy.

The present invention is not limited to those embodiments described above. For example, the search terms entered by the user need not only be textual. The present invention also includes embodiments that can perform searches on dates, phone numbers, number ranges, proximity (i.e. Is X within 5 miles of Y?), field searches and Boolean searches. In addition, the present invention may be used with other types of queries such as natural language and context-sensitive queries.

Another embodiment of the present invention includes alternative queries placed into the cache. For example, before the first query is processed, precompiled queries such as those that are known to take a long time or are particularly timely, can be pre-loaded into the cache to save time.

The present invention is also not limited to two taxonomies. Any data collection can be represented by an unlimited number of independent taxonomies. Alternative embodiments are envisioned that include viewing data by company and industry. If a job listing database is compiled the jobs can be viewed by job type, the location of the job, the salary, the required experience and if there are any special interests (i.e. CPA required).

The present invention is also not limited to when certain taxonomies are provided to the user. As described above, the user is presented with the taxonomy last selected. Thus, if the user is using the "Location" taxonomy and enters a new search term, the results will be displayed following the "Location" taxonomy described above. However, in an alternative embodiment, the system can switch among taxonomies automatically for the user in an effort to present the search results in a more meaningful manner. For example, if the user selects the final sub-category in the chain, the system will automatically switch over to another

taxonomy so as to provide the user with more context and scope regarding the remaining search results. Thus, if there are no sub-categories under "tires," the present invention will switch to the "Location" taxonomy so that the user can easily determine where the tire salesmen are located. This switching can also be based on the number of hits. If the category contains only two hits, the system will automatically switch to the "Location" taxonomy and thereby provide the user with the useful information to locate these two tire salesmen. Similarly, the automatic taxonomy switching may also be based on a particular taxonomy where the number of categories or sub-categories is small. For instance, providing the user with the information that all the hit records are located in one category does not provide any information the user can use to distinguish between these records. Switching to another taxonomy may provide the user with more categories he/she can use to distinguish between the hit records.

It will be appreciated that there is no limit to the depth of the categories and sub-categories. Additionally, it will be appreciated that the present invention can be implemented in an interface other than the Web.

It will further be appreciated that one preferred embodiment of the present invention is a system for searching a collection of data, said system comprising: an organizer configured to receive search requests, said organizer comprising: a collection of data having at least two entries; wherein the collection of data is organized into at least two taxonomies; wherein each of the at least two taxonomies is associated with at least two categories; wherein the entries correspond to at least one of the at least two taxonomies and also correspond to at least one of the at least two categories; and a search engine in communication with the collection of data, wherein said search engine is configured to search based on the at least two taxonomies and based on the at least two categories, wherein the search engine returns, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the

categories associated with the at least first identified taxonomies, along with the number of entries associated with each of the categories associated with the at least first identified taxonomies.

In a preferred embodiment of the present invention, the returned list of categories associated with the first taxonomy, along with the number of entries associated with each of the categories associated with the identified taxonomies can be further searched with regard to a second of the at least two taxonomies, whereby the search engine returns, in response to a search request identifying the second taxonomy of the at least two taxonomies, a list of the categories associated with all identified taxonomies, along with the number of entries associated with each of the categories associated with the second taxonomy.

In another preferred embodiment, the search engine, having returned, in response to a search request identifying a first taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies, will provide only those categories with a non-zero number of entries associated with the identified taxonomies and will further return sub-categories both associated with the category and having a non-zero number of entries associated with the sub-category.

Still further in another preferred embodiment, the search engine, having further returned sub-categories both associated with the category and having a non-zero number of entries associated with the sub-category, will, in response to a search request identifying a second taxonomy of the at least two taxonomies, provide a list of the categories with a non-zero number of entries associated with the at least second identified taxonomies, along with the number of entries associated with each of the categories associated with the second identified taxonomies.

In another embodiment, the search engine, having returned, in response to a search request identifying a first taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies, will, in response to a string query, provide those entries which both contain the string and are associated with the identified taxonomies. The string is preferably one member of the group consisting of text, image, and graphic.

The present invention can be either a network of computers or a single computer.

The present invention preferably comprises a cache which stores the returned results of the search engine for rapid retrieval.

There are many preferred taxonomies, including at least one taxonomy selected from the group consisting of product type, price, color, size, style, physical characteristics, delivery method, manufacturer, brand, components, ingredients, compatibility, warranty information, model year, age, and version; the group consisting of products, services, location, industry, business type, SIC code, NAICS code, Harmonized Code, UNSPC Standard, company information, professional information, and degrees attained; the group consisting of organism, biological process, molecular function, and cellular component; the group consisting of topic, date published, author, country of origin, language, publication name, publication section, industry, security accessibility, jurisdiction, Dewey Decimal identification, statutory codification, hierarchical management structure taxonomies, and standardized methodologies for conducting business taxonomies; and the group consisting of company, industry, job type, location, salary, experience, certifications, benefits, education, minimum performance requirements, and incentives.

In preferred embodiments, the company information is selected from size, number of employees, growth, revenues, financial ratios, and business metrics, and the professional

information is selected from school attended, memberships, certifications, specialties, areas of practice.

In another preferred embodiment of the present invention, the present invention will, in response to a search request identifying one member selected from the group consisting of a taxonomy, a category, and a sub-category, the search engine additionally return an advertising entry. Preferably, the advertising entry is either a banner advertisement, a search-visible storefront or text-searchable advertising.

Various preferred embodiments of the invention have been described in fulfillment of the various objects of the invention. It should be recognized that these embodiments are merely illustrative of the principles of the invention. Numerous modifications and adaptations thereof will be readily apparent to those skilled in the art without departing from the spirit and scope of the present invention.

CLAIMS

1. A system for searching a collection of data, said system comprising:

an organizer configured to receive search requests, said organizer comprising:

a collection of data having at least two entries;

wherein the collection of data is organized into at least two taxonomies;

wherein each of the at least two taxonomies is associated with at least two categories;

wherein the entries correspond to at least one of the at least two taxonomies and also correspond to at least one of the at least two categories; and

a search engine in communication with the collection of data,

wherein said search engine is configured to search based on the at least two taxonomies and based on the at least two categories,

wherein the search engine returns, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the categories associated with the at least first identified taxonomies, along with the number of entries associated with each of the categories associated with the at least first identified taxonomies.

2. The system according to Claim 1, wherein the returned list of categories associated with the first taxonomy, along with the number of entries associated with each of the categories associated with the identified taxonomies can be further searched with regard to a second of the at least two taxonomies, whereby the search engine returns, in response to a search request identifying the second taxonomy of the at least two taxonomies, a list of the categories associated with all identified taxonomies, along with the number of entries associated with each of the categories associated with all identified taxonomies.

3. The system according to Claim 1, wherein the search engine, having returned, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies, will provide only those categories with a non-zero number of entries associated with the identified taxonomies and will further return sub-categories both associated with the category and having a non-zero number of entries associated with the sub-category.

4. The system according to Claim 3, wherein the search engine, having further returned sub-categories both associated with the category and having a non-zero number of entries associated with the sub-category, will, in response to a search request identifying at least a second taxonomy of the at least two taxonomies, provide a list of the categories with a non-zero number of entries associated with the at least second identified taxonomies, along with the number of entries associated with each of the categories associated with the at least second identified taxonomies.

5. The system according to Claim 1, wherein the search engine, having returned, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies, will, in response to a string query, provide those entries which both contain the string and are associated with the identified taxonomies.

6. The system according to Claim 5, wherein the string is one member of the group consisting of text, image, and graphic.

7. The system according to Claim 1, wherein the system comprises a network of computers.

8. The system according to Claim 1, wherein the system comprises a single computer.

9. The system according to Claim 1, wherein the system further comprises a cache which stores the returned results of the search engine for rapid retrieval.

10. The system for searching a collection of data according to Claim 1, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of product type, price, color, size, style, physical characteristics, delivery method, manufacturer, brand, components, ingredients, compatibility, warranty information, model year, age, and version.

11. The system for searching a collection of data according to Claim 1, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of products, services, location, industry, business type, SIC code, NAICS code, Harmonized Code, UNSPC Standard, company information, professional information, and degrees attained.

12. The system for searching a collection of data according to Claim 11, wherein the company information is at least one characteristic selected from the group consisting of size, number of employees, growth, revenues, financial ratios, and business metrics.

13. The system for searching a collection of data according to Claim 11, wherein the professional information is at least one characteristic selected from the group consisting of school attended, memberships, certifications, specialties, areas of practice.

14. The system for searching a collection of data according to Claim 1, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of organism, biological process, molecular function, species, and cellular component.

15. The system for searching a collection of data according to Claim 1, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of topic, date published, author, country of origin, language, publication name, publication section, industry, security accessibility, jurisdiction, Dewey Decimal identification, statutory codification, hierarchical management structure taxonomies, and standardized methodologies for conducting business taxonomies.

16. The system for searching a collection of data according to Claim 1, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of company, industry, job type, location, salary, experience, certifications, benefits, education, minimum performance requirements, and incentives.

17. The system for searching a collection of data according to Claim 1, wherein, in response to a search request identifying one member selected from the group consisting of a taxonomy, a category, and a sub-category, the search engine additionally returns an advertising entry.

18. The system for searching a collection of data according to Claim 17, wherein the advertising entry is at least one member selected from the group consisting of a banner advertisement, search-visible storefront, and text-searchable advertising.

19. A system for searching a collection of data, said system comprising:

means for networking a plurality of computers; and

means for organizing executing in said computer network and configured to receive search requests from any one of said plurality of computers, said means for organizing comprising:

a collection of data having at least two entries;

wherein the collection of data is organized into at least two taxonomies;

wherein each of the at least two taxonomies is associated with at least two categories;

wherein the entries correspond to at least one of the at least two taxonomies and also correspond to at least one of the at least two categories; and

means for searching in communication with the collection of data,

wherein said means for searching is configured to search based on the at least two taxonomies and based on the at least two categories,

wherein the means for searching returns, in response to a search request identifying at least one taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies.

20. The system according to Claim 19, wherein the returned list of categories associated with the first taxonomy, along with the number of entries associated with each of the categories associated with the at least identified taxonomics can be further searched with

regard to at least a second taxonomy of the at least two taxonomies, whereby the means for searching returns, in response to a search request identifying the at least second taxonomies of the at least two taxonomies, a list of the categories associated with all identified taxonomies, along with the number of entries associated with each of the categories associated with the at least second taxonomies.

21. The system according to Claim 19, wherein the means for searching, having returned, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies, will provide only those categories with a non-zero number of entries associated with the identified taxonomies and will further provide sub-categories associated with the category and having a non-zero number of entries associated with the sub-category.

22. The system according to Claim 21, wherein the means for searching, having further returned sub-categories both associated with the category and having a non-zero number of entries associated with the sub-category, will, in response to a search request identifying at least a second taxonomies of the at least two taxonomies, provide a list of the categories with a non-zero number of entries associated with the at least second identified taxonomies, along with the number of entries associated with each of the categories associated with the at least second identified taxonomies.

23. The system according to Claim 19, wherein the means for searching, having returned, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the

number of entries associated with each of the categories associated with the identified taxonomies, will, in response to a string query, provide those entries which both contain the string and are associated with the identified taxonomies.

24. The system according to Claim 23, wherein the string is one member of the group consisting of text, image, and graphic.

25. The system according to Claim 19, wherein the system comprises a network of computers.

26. The system according to Claim 19, wherein the system comprises a single computer.

27. The system according to Claim 19, wherein the system further comprises a cache which stores the returned results of the means for searching for rapid retrieval.

28. The system for searching a collection of data according to Claim 19, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of product type, price, color, size, style, physical characteristics, delivery method, manufacturer, brand, components, ingredients, compatibility, warranty information, model year, age, and version.

29. The system for searching a collection of data according to Claim 19, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of products, services, location, industry, business type, SIC code, NAICS code, Harmonized Code, UNSPC Standard, company information, professional information, and degrees attained.

30. The system for searching a collection of data according to Claim 29, wherein the company information is at least one characteristic selected from the group consisting of size, number of employees, growth, revenues, financial ratios, and business metrics.

31. The system for searching a collection of data according to Claim 29, wherein the professional information is at least one characteristic selected from the group consisting of school attended, memberships, certifications, specialties, areas of practice.

32. The system for searching a collection of data according to Claim 19, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of organism, biological process, molecular function, species, and cellular component.

33. The system for searching a collection of data according to Claim 19, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of topic, date published, author, country of origin, language, publication name, publication section, industry, security accessibility, jurisdiction, Dewey Decimal identification, statutory codification, hierarchical management structure taxonomies, and standardized methodologies for conducting business taxonomies.

34. The system for searching a collection of data according to Claim 19, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of company, industry, job type, location, salary, experience, certifications, benefits, education, minimum performance requirements, and incentives.

35. The system for searching a collection of data according to Claim 19, wherein, in response to a search request identifying one member selected from the group consisting of a taxonomy, a category, and a sub-category, the means for searching additionally returns an advertising entry.

36. The system for searching a collection of data according to Claim 35, wherein the advertising entry is at least one member selected from the group consisting of a banner advertisement, a search-visible storefront, and text-searchable advertising.

37. A method for searching a collection of data, said method comprising:

communicating a search request to a search engine, the search engine being in communication with a collection of data;

wherein the collection of data has at least two entries;

wherein the collection of data is organized into at least two taxonomies;

wherein each of the at least two taxonomies is associated with at least two categories;

wherein the at least two entries correspond to at least one of the at least two taxonomies and also correspond to at least one of the at least two categories;

querying of the collection of data by the search engine based on the communicated search request;

wherein the communicated search request identifies at least one of the at least two taxonomies;

returning of a list of the categories associated with the at least one identified taxonomies, along with the number of entries associated with each of the categories associated with the at least one identified taxonomies as a response to the querying of the collection of data.

38. The method for searching a collection of data according to Claim 37, wherein the method further comprises

returning, in response to a search request identifying at least a second taxonomy of the at least two taxonomies, a list of the categories associated with all identified taxonomies, along with the number of entries associated with each of the categories associated with the at least second taxonomy.

39. The method for searching a collection of data according to Claim 37, wherein the method further comprises

returning a list of only those categories with a non-zero number of entries associated with the identified taxonomies and further returning at least one sub-category associated with the category and having a non-zero number of entries associated with the sub-category.

40. The method for searching a collection of data according to Claim 39, wherein the method further comprises

having further returned sub-categories both associated with the category and having a non-zero number of entries associated with the sub-category, providing, in response to a search request identifying at least a second taxonomy of the at least two taxonomies, provide a list of the categories with a non-zero number of entries associated with the at least second identified taxonomies, along with the number of entries associated with each of the categories associated with the at least second identified taxonomies.

41. The method for searching a collection of data according to Claim 37, wherein the method further comprises

returning, in response to a string query, provide those entries which both contain the string and are associated with the identified taxonomies.

42. The method for searching a collection of data according to Claim 41, wherein the string is one member of the group consisting of text, image, and graphic.

43. The method for searching a collection of data according to Claim 37, wherein the system comprises a network of computers.

44. The method for searching a collection of data according to Claim 37, wherein the system comprises a single computer.

44. The method for searching a collection of data according to Claim 37, wherein the system further comprises a cache which stores the returned results of the means for searching for rapid retrieval.

45. The method for searching a collection of data according to Claim 37, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of product type, price, color, size, style, physical characteristics, delivery method, manufacturer, brand, components, ingredients, compatibility, warranty information, model year, age, and version.

46. The method for searching a collection of data according to Claim 37, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of products, services, location, industry, business type, SIC code, NAICS code, Harmonized

Code, UNSPC Standard, company information, professional information, and degrees attained.

47. The method for searching a collection of data according to Claim 46, wherein the company information is at least one characteristic selected from the group consisting of size, number of employees, growth, revenues, financial ratios, and business metrics.

48. The method for searching a collection of data according to Claim 46, wherein the professional information is at least one characteristic selected from the group consisting of school attended, memberships, certifications, specialties, areas of practice.

49. The method for searching a collection of data according to Claim 37, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of organism, biological process, molecular function, species, and cellular component.

50. The method for searching a collection of data according to Claim 37, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of topic, date published, author, country of origin, language, publication name, publication section, industry, security accessibility, jurisdiction, Dewey Decimal identification, statutory codification, hierarchical management structure taxonomies, and standardized methodologies for conducting business taxonomies.

51. The method for searching a collection of data according to Claim 37, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of

company, industry, job type, location, salary, experience, certifications, benefits, education, minimum performance requirements, and incentives.

52. The method for searching a collection of data according to Claim 37, wherein the method further comprises

returning by the search engine additionally, in response to a search request identifying one member selected from the group consisting of a taxonomy, a category, and a sub-category, an advertising entry.

53. The method for searching a collection of data according to Claim 52, wherein the advertising entry is at least one member selected from the group consisting of a banner advertisement, a search-visible storefront, and text-searchable advertising.

54. An article of manufacture comprising:

a computer usable medium having computer program code means embodied thereon for searching a collection of data, the computer readable program code means in said article of manufacture comprising:

computer readable program code means for communicating a search request to a search engine, the search engine being in communication with a collection of data;

wherein the collection of data has at least two entries;

wherein the collection of data is organized into at least two taxonomies;

wherein each of the at least two taxonomies is associated with at least two categories;

wherein the at least two entries correspond to at least one of the at least two taxonomies and also correspond to at least one of the at least two categories;

computer readable program code means for querying of the collection of data by the search engine based on the communicated search request;

wherein a communicated search request identifies at least one of the at least two taxonomies; and

computer readable program code means for returning of a list of the categories associated with the at least one identified taxonomies, along with the number of entries associated with each of the categories associated with the at least one identified taxonomies as a response to the querying of the collection of data.

55. The article of manufacture according to Claim 54, wherein the returned list of categories associated with the at least first taxonomy, along with the number of entries associated with each of the categories associated with the identified taxonomies can be further searched with regard to a second of the at least two taxonomies, whereby the computer readable program code means for querying of the collection of data by the search engine returns, in response to a search request identifying the at least second taxonomies of the at least two taxonomies, a list of the categories associated with both identified taxonomies, along with the number of entries associated with each of the categories associated with the at least second taxonomies.

56. The article of manufacture according to Claim 54, wherein the computer readable program code means for querying of the collection of data by the search engine, having returned, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies, will provide only those categories with a non-zero number of entries associated

with the identified taxonomies and will further provide sub-categories associated with the category and having a non-zero number of entries associated with the sub-category.

57. The article of manufacture according to Claim 56, wherein the computer readable program code means for querying of the collection of data by the search engine, having further returned sub-categories both associated with the category and having a non-zero number of entries associated with the sub-category, will, in response to a search request identifying at least a second taxonomy of the at least two taxonomies, provide a list of the categories with a non-zero number of entries associated with the at least second identified taxonomies, along with the number of entries associated with each of the categories associated with the at least second identified taxonomies.

58. The article of manufacture according to Claim 54, wherein the means for searching, having returned, in response to a search request identifying at least a first taxonomy of the at least two taxonomies, a list of the categories associated with the identified taxonomies, along with the number of entries associated with each of the categories associated with the identified taxonomies, will, in response to a string query, provide those entries which both contain the string and are associated with the identified taxonomics.

59. The article of manufacture according to Claim 58, wherein the string is one member of the group consisting of text, image, and graphic.

60. The article of manufacture according to Claim 54, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of product type, price, color,

size, style, physical characteristics, delivery method, manufacturer, brand, components, ingredients, compatibility, warranty information, model year, age, and version.

61. The article of manufacture according to Claim 54, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of products, services, location, industry, business type, SIC code, NAICS code, Harmonized Code, UNSPC Standard, company information, professional information, and degrees attained.

62. The article of manufacture according to Claim 61, wherein the company information is at least one characteristic selected from the group consisting of size, number of employees, growth, revenues, financial ratios, and business metrics.

63. The article of manufacture according to Claim 61, wherein the professional information is at least one characteristic selected from the group consisting of school attended, memberships, certifications, specialties, areas of practice.

64. The article of manufacture according to Claim 54, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of topic, date published, author, country of origin, language, publication name, publication section, industry, security accessibility, jurisdiction, Dewey Decimal identification, statutory codification, hierarchical management structure taxonomies, and standardized methodologies for conducting business taxonomies.

65. The article of manufacture according to Claim 54, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of company, industry, job

type, location, salary, experience, certifications, benefits, education, minimum performance requirements, and incentives.

66. The article of manufacture according to Claim 54, wherein at least one taxonomy of the at least two taxonomies is selected from the group consisting of organism, biological process, molecular function, species, and cellular component.

67. The article of manufacture according to Claim 54, wherein, in response to a search request identifying one member selected from the group consisting of a taxonomy, a category, and a sub-category, the search engine additionally returns an advertising entry.

68. The article of manufacture Claim 67, wherein the advertising entry is at least one member selected from the group consisting of a banner advertisement, a search-visible storefront, and text-searchable advertising.

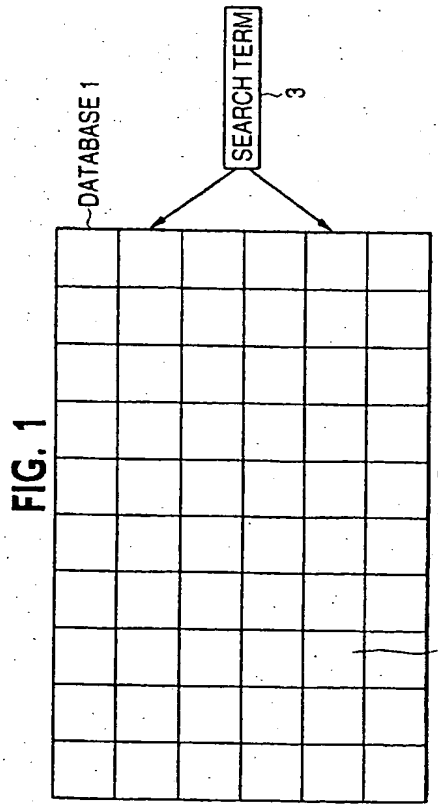


FIG. 1

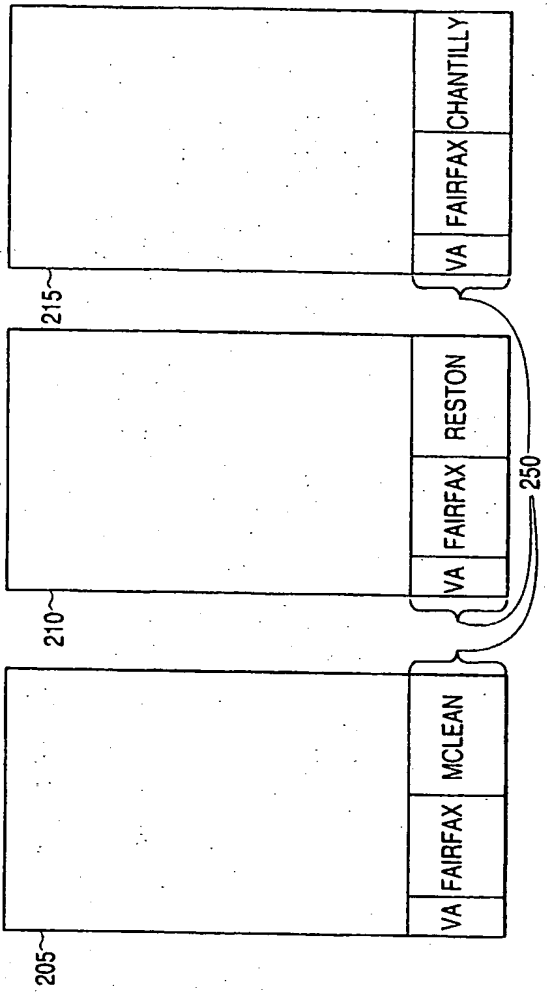


FIG. 2

FIG. 3

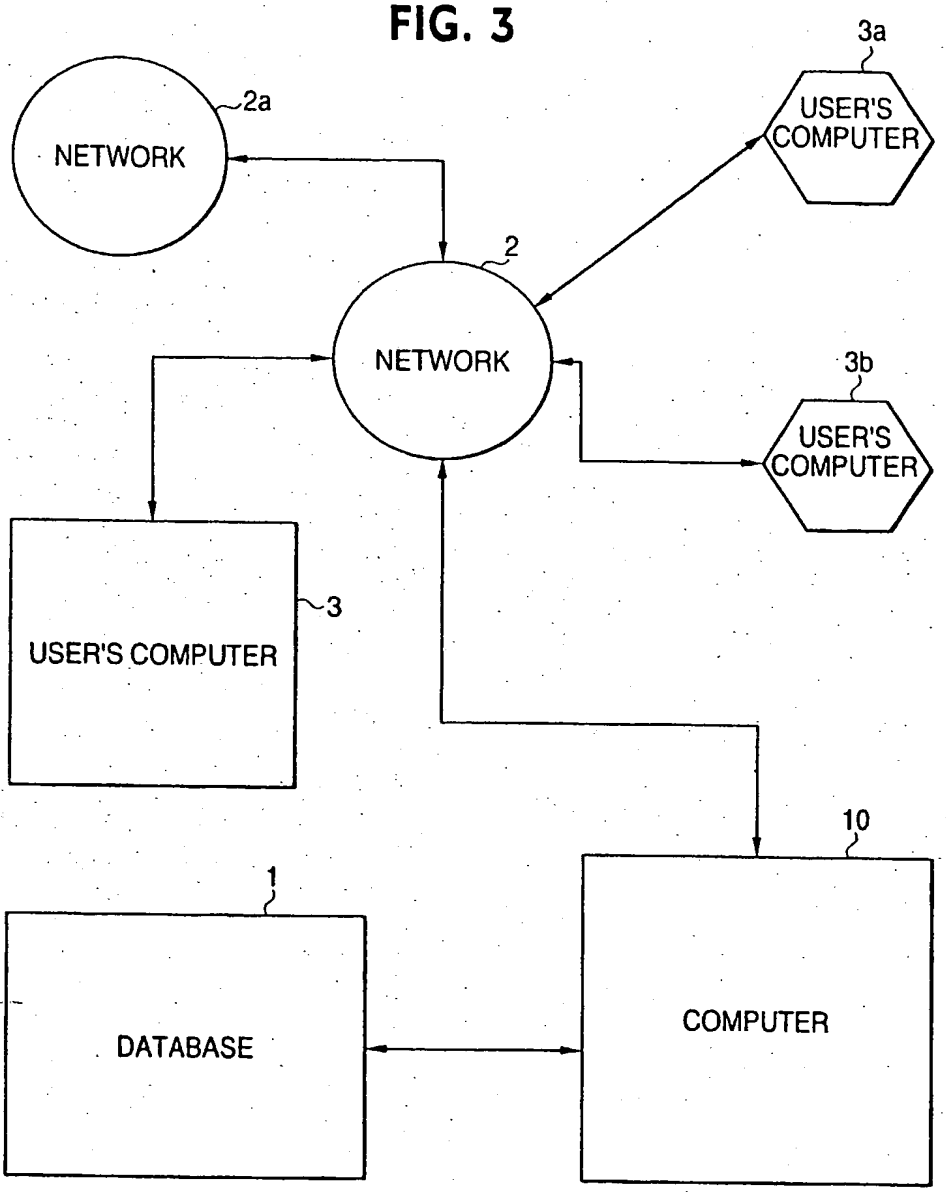


FIG. 4

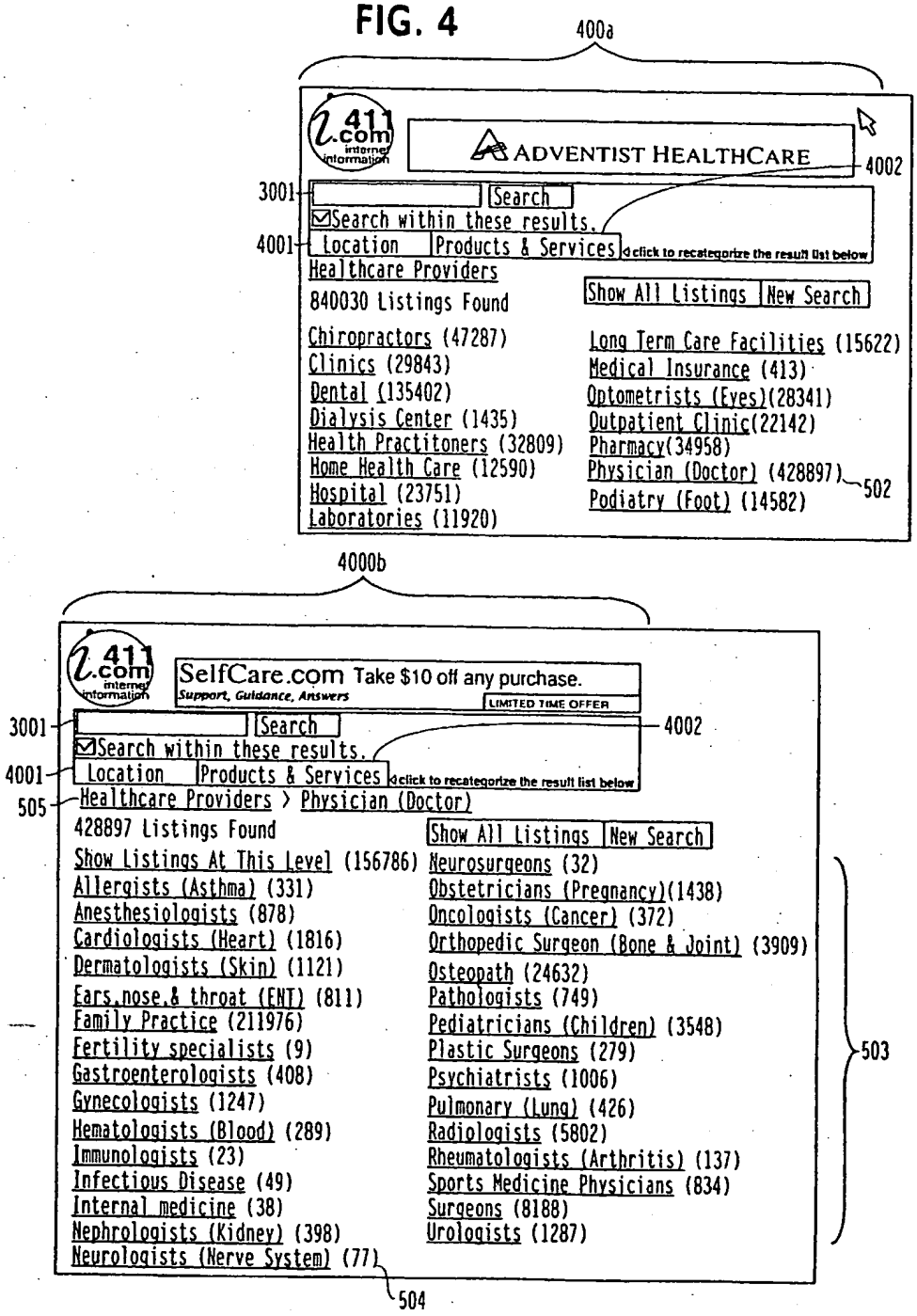


FIG. 5

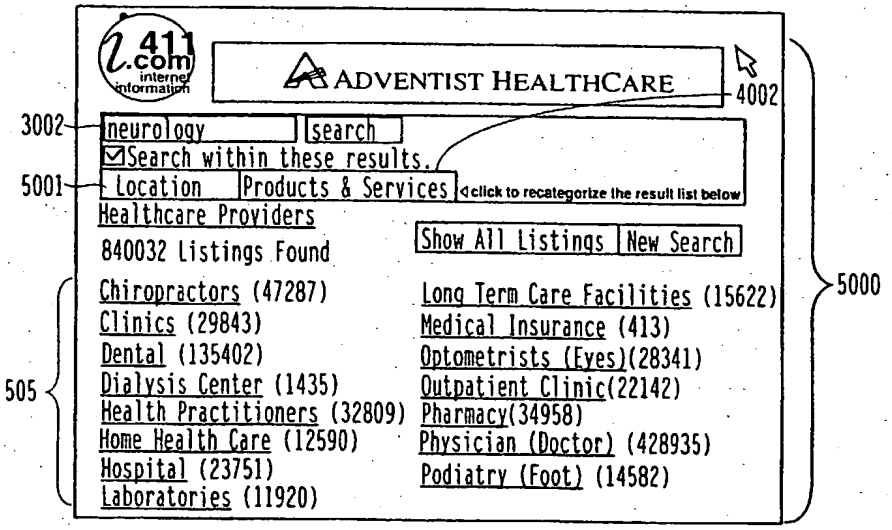


FIG. 6

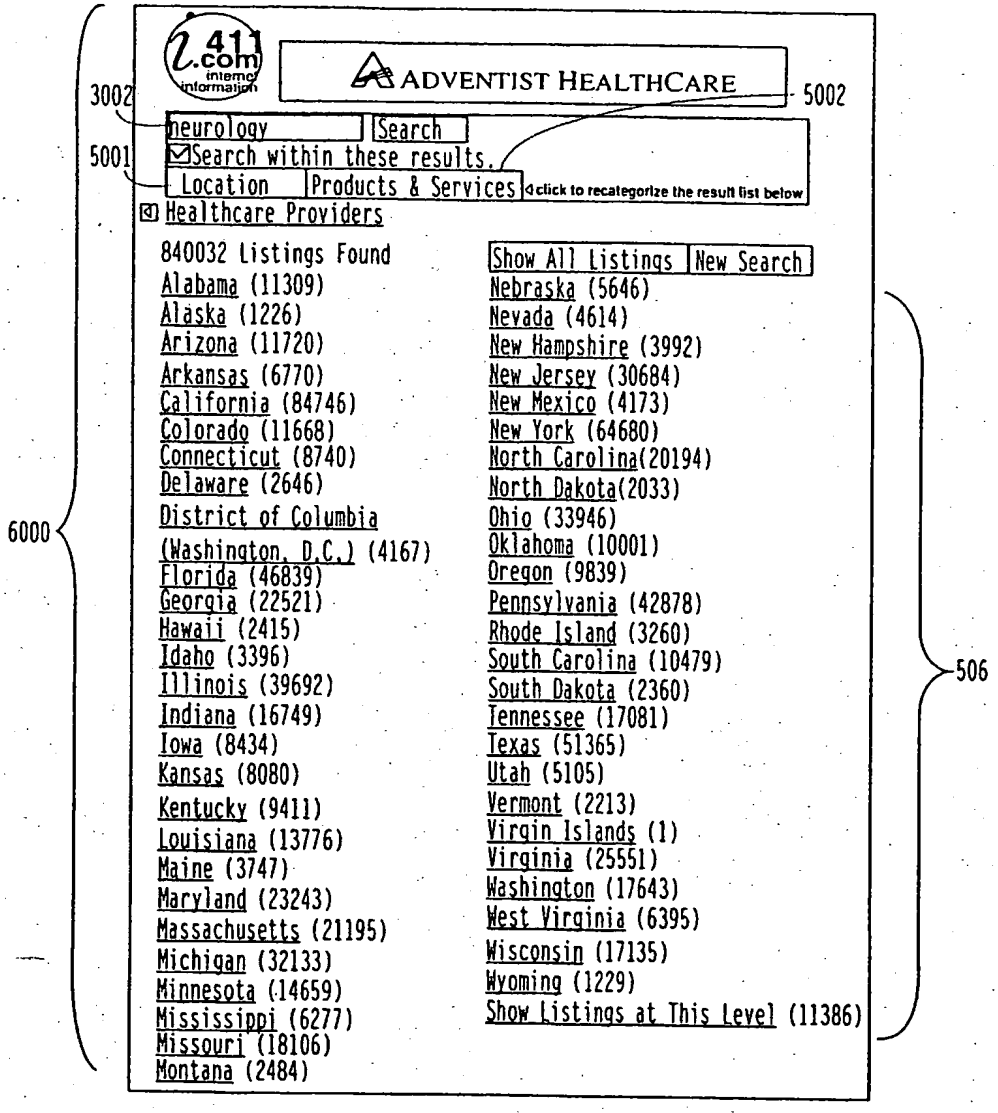


FIG. 7

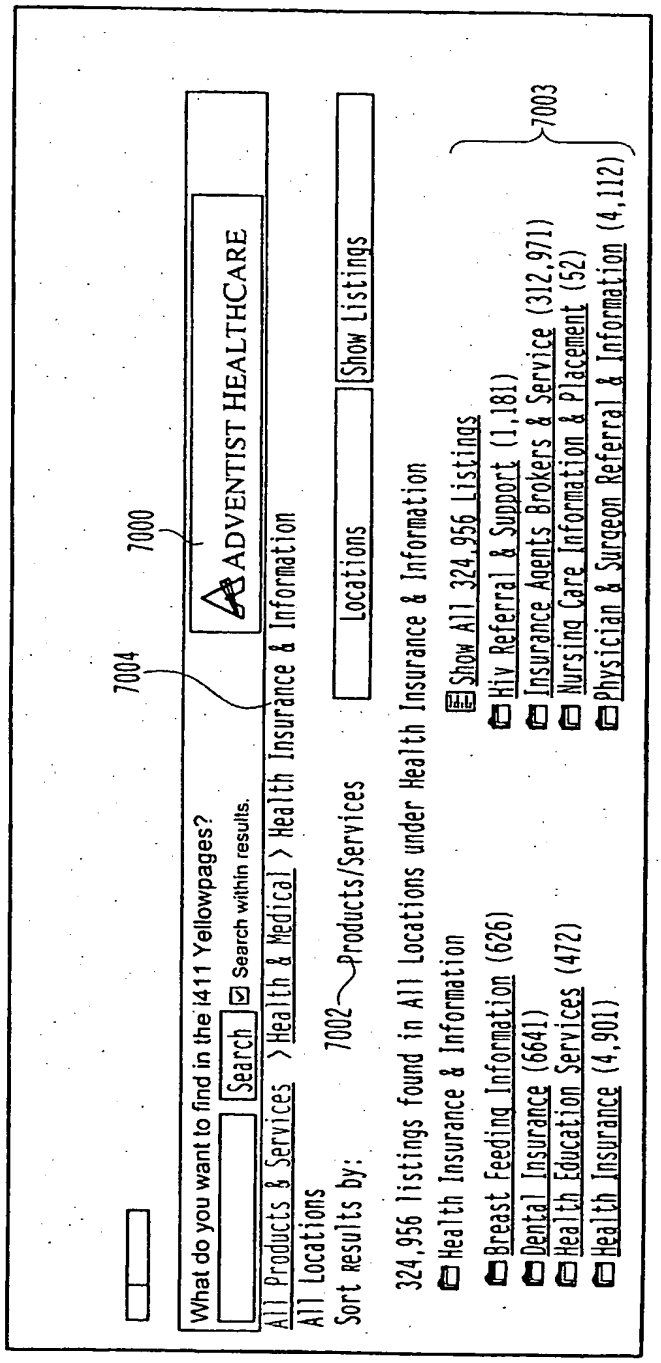
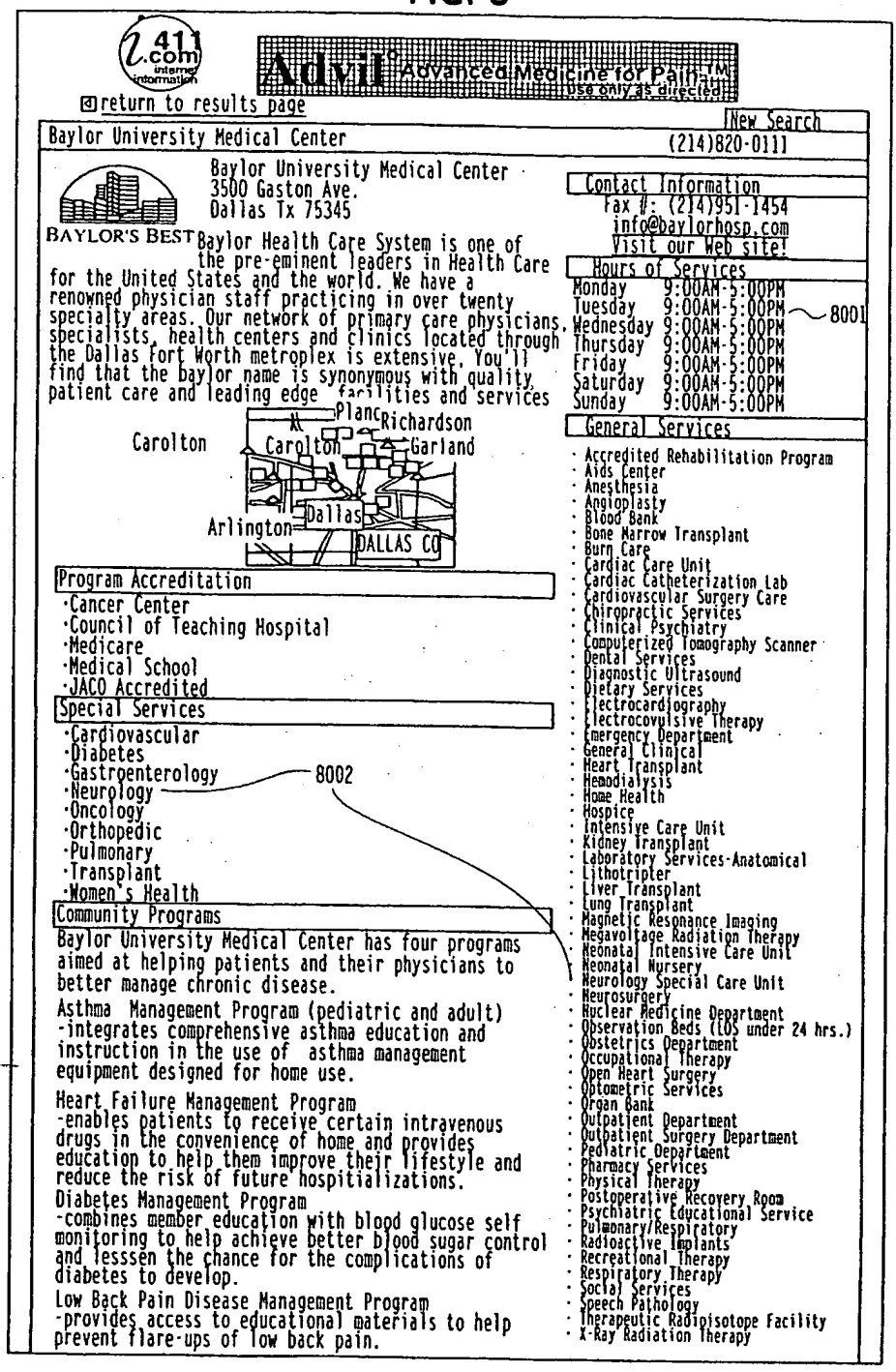


FIG. 8



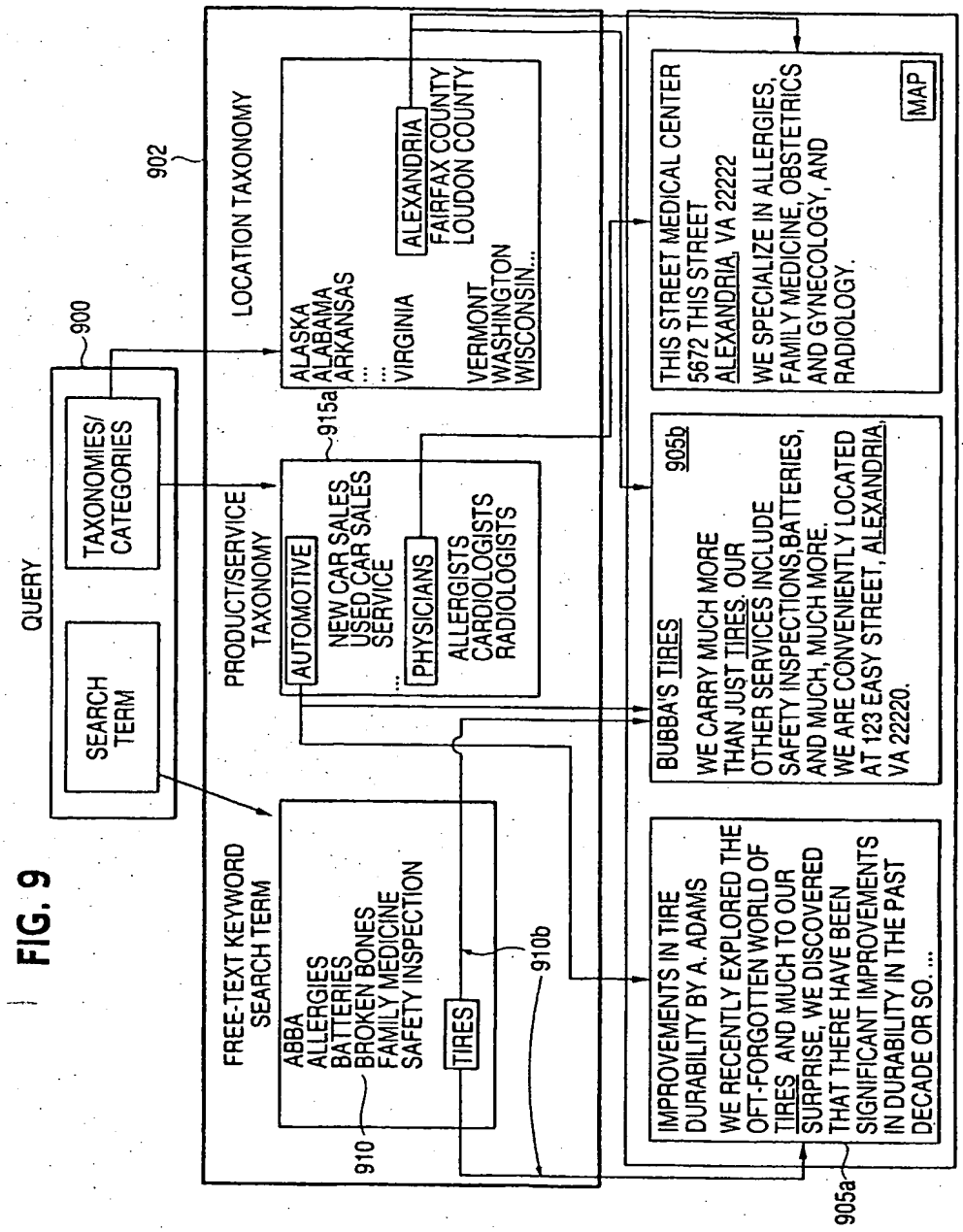


FIG. 9

FIG. 10

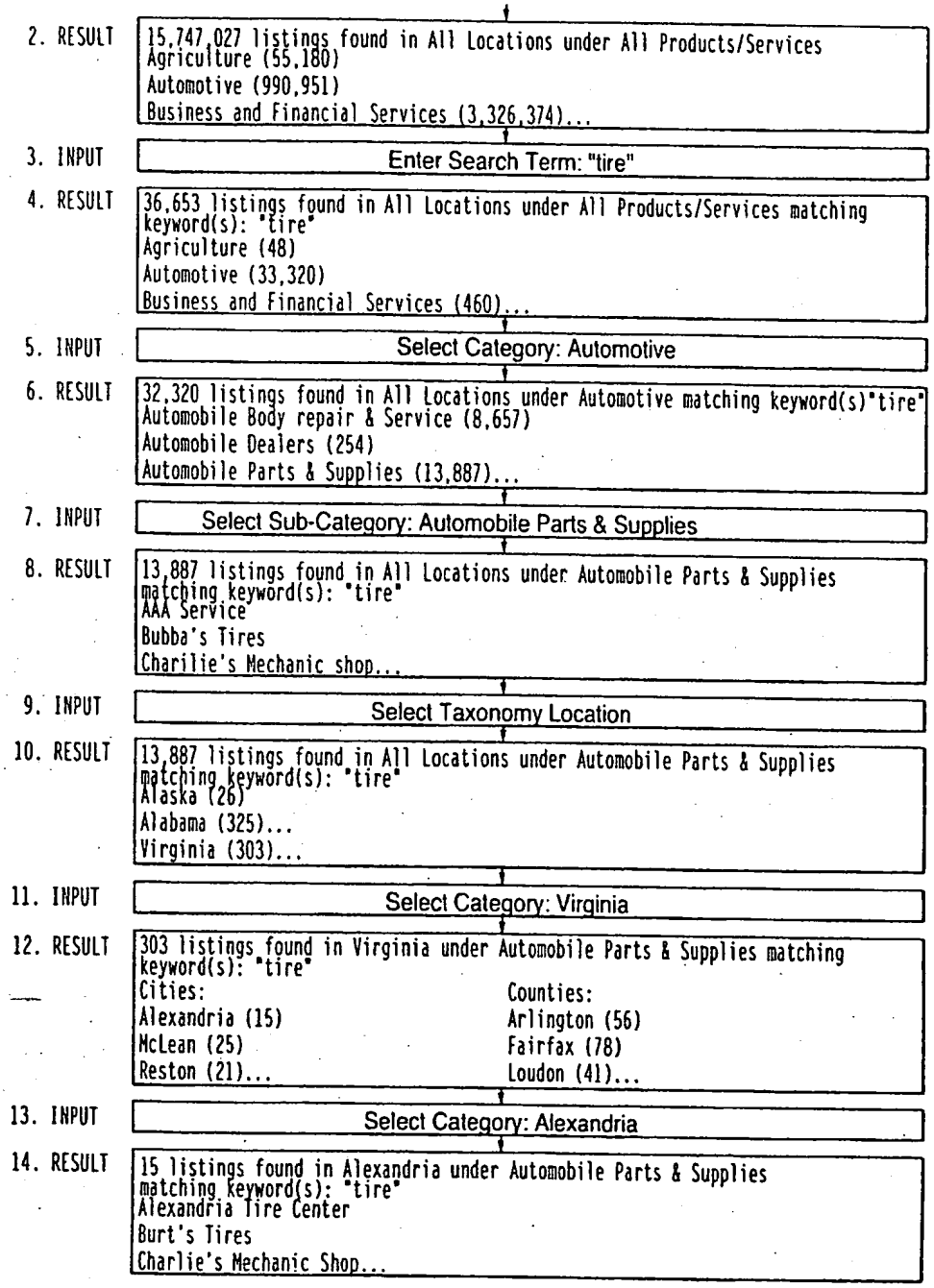


FIG. 11

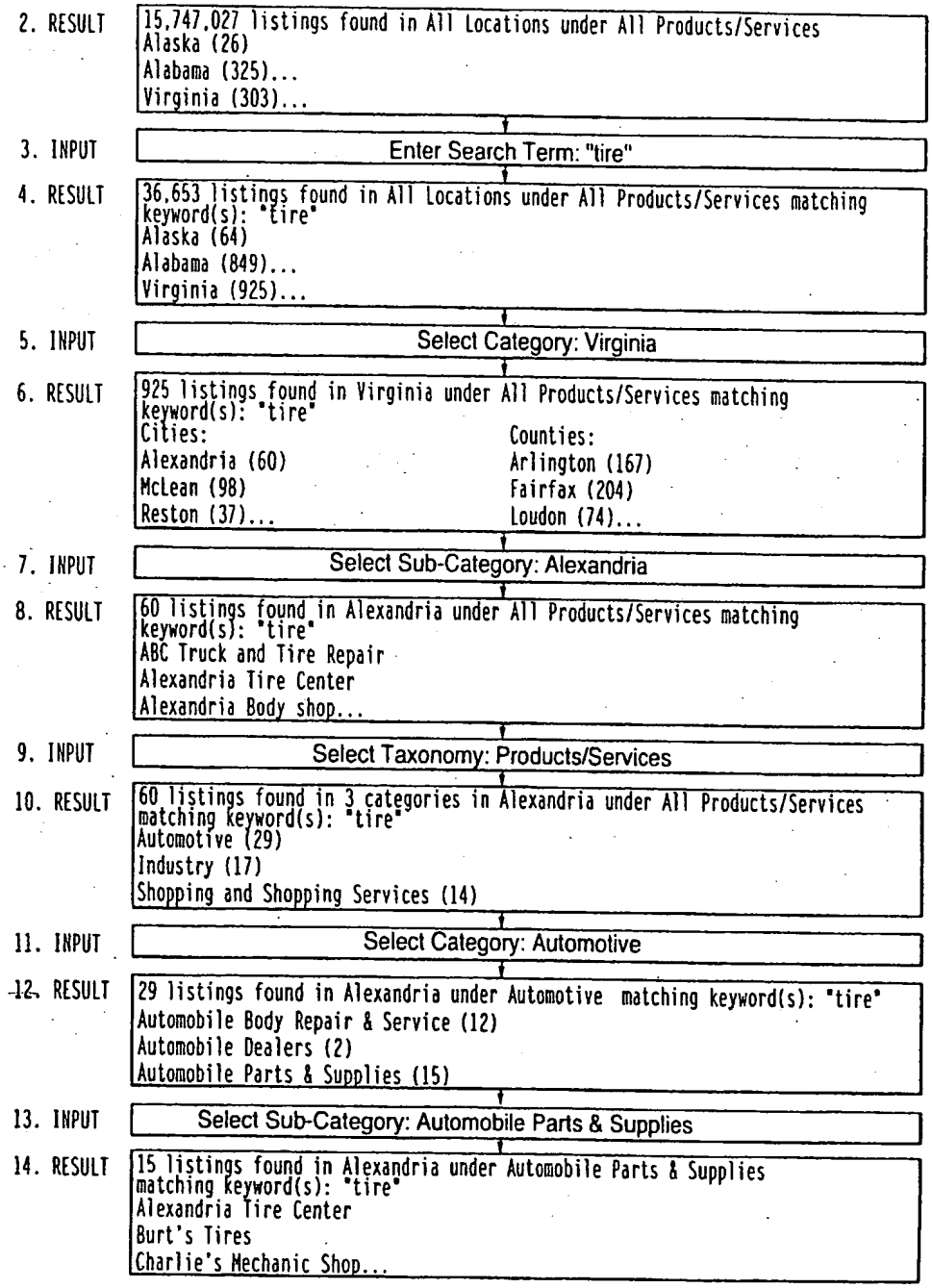


FIG. 12

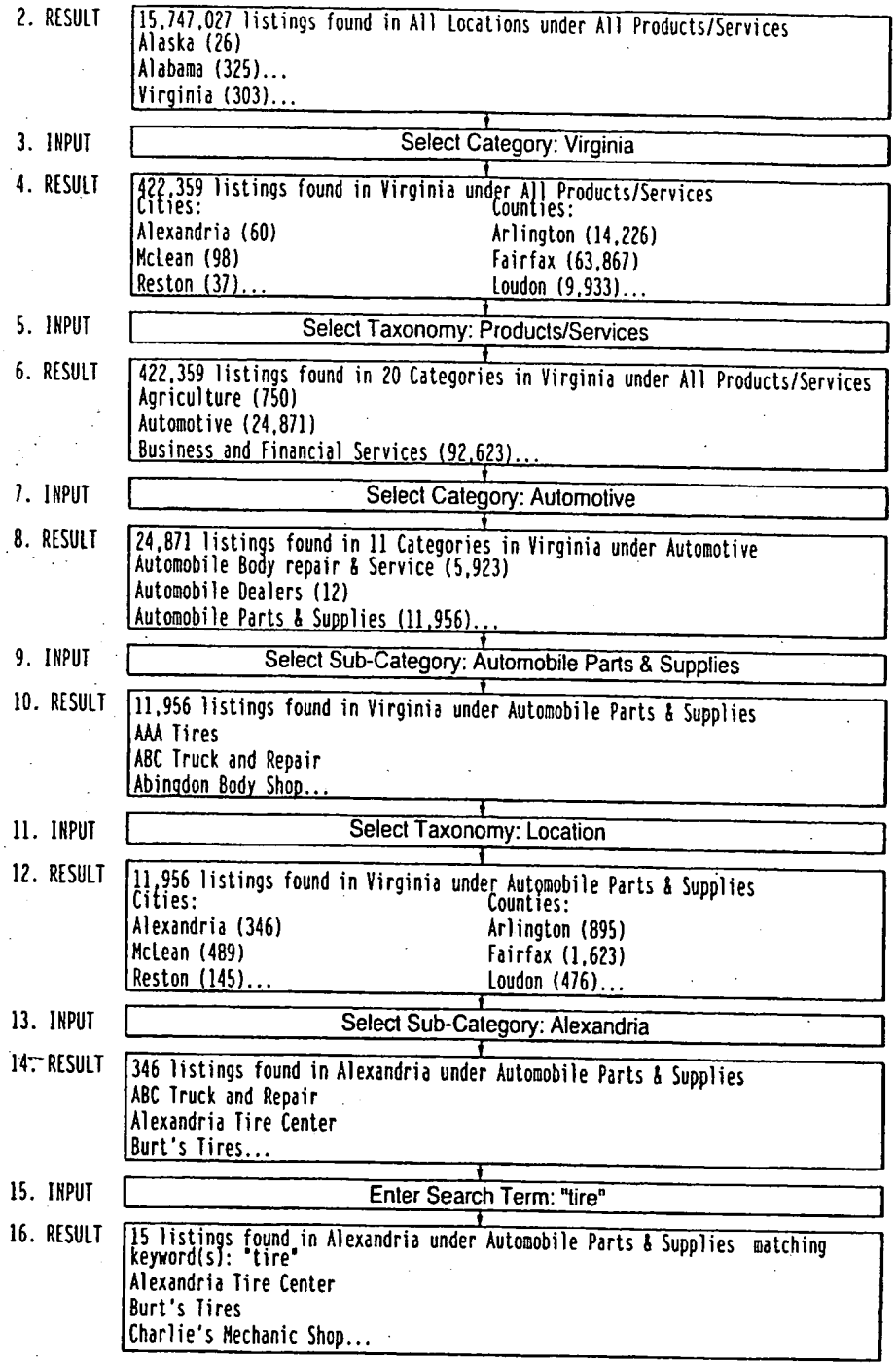


FIG. 13

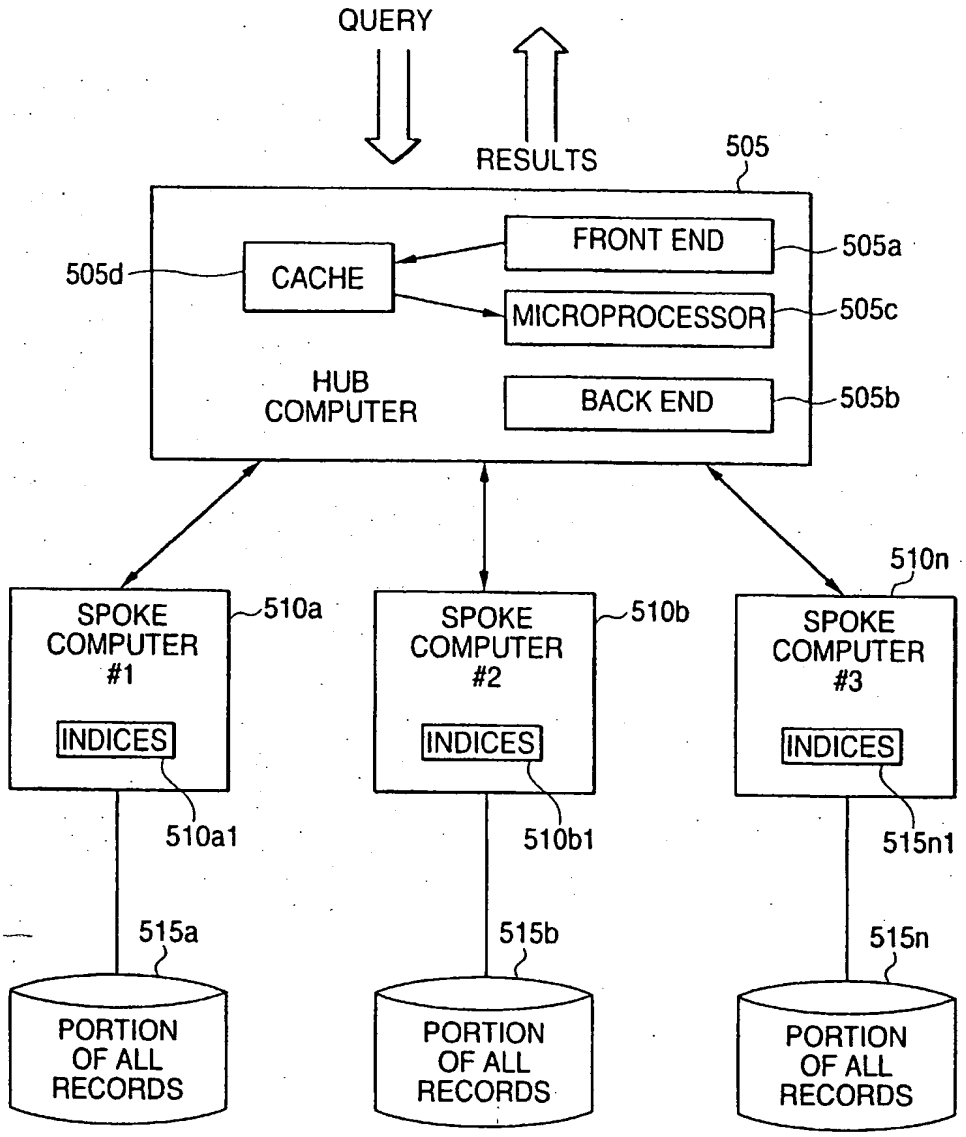


FIG. 14

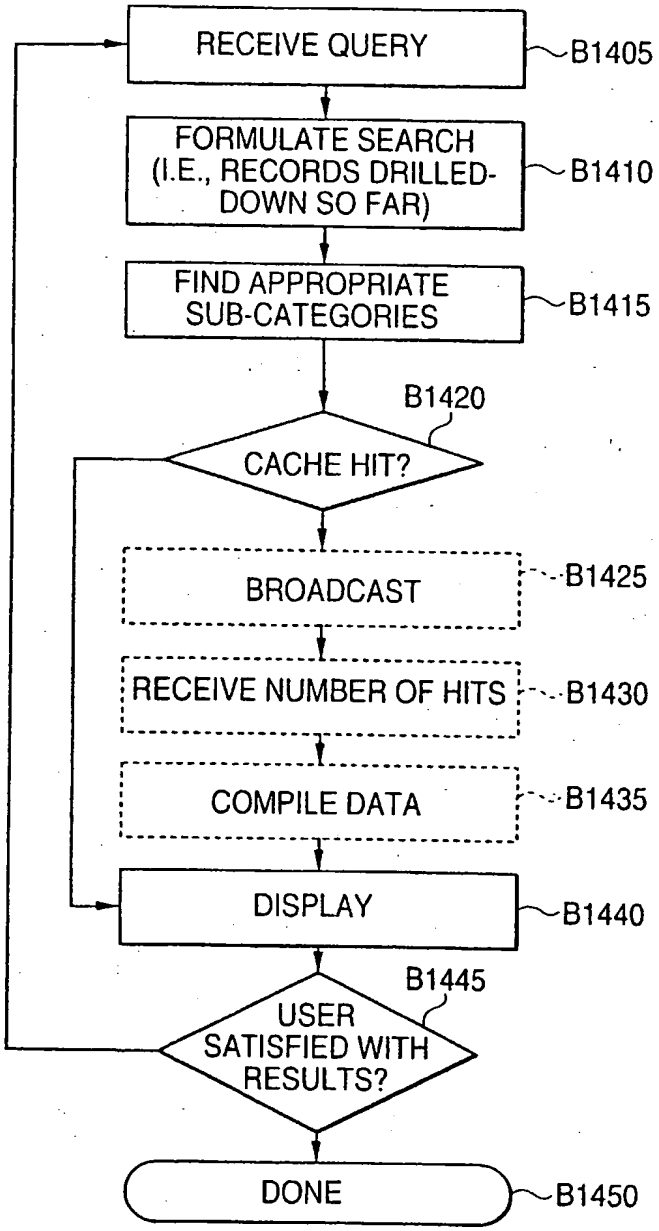


FIG. 15

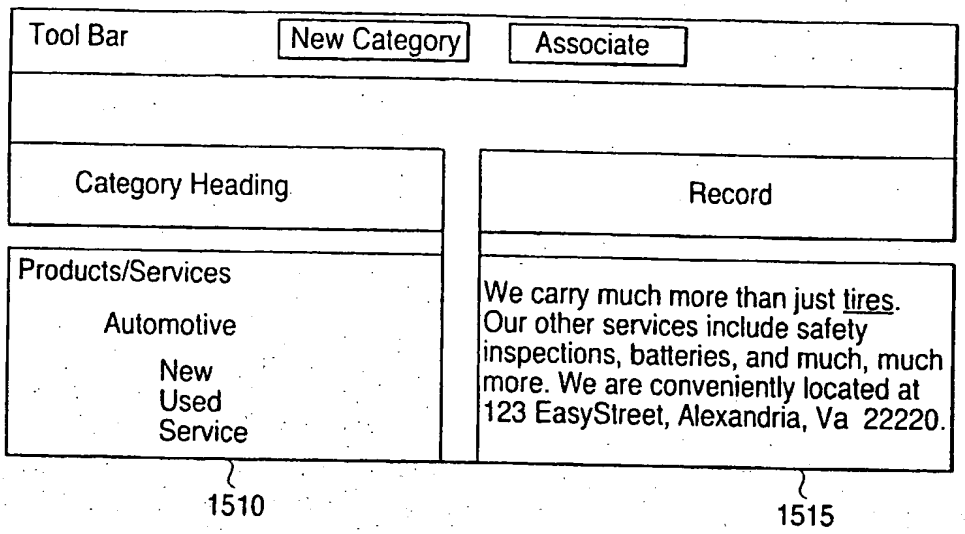
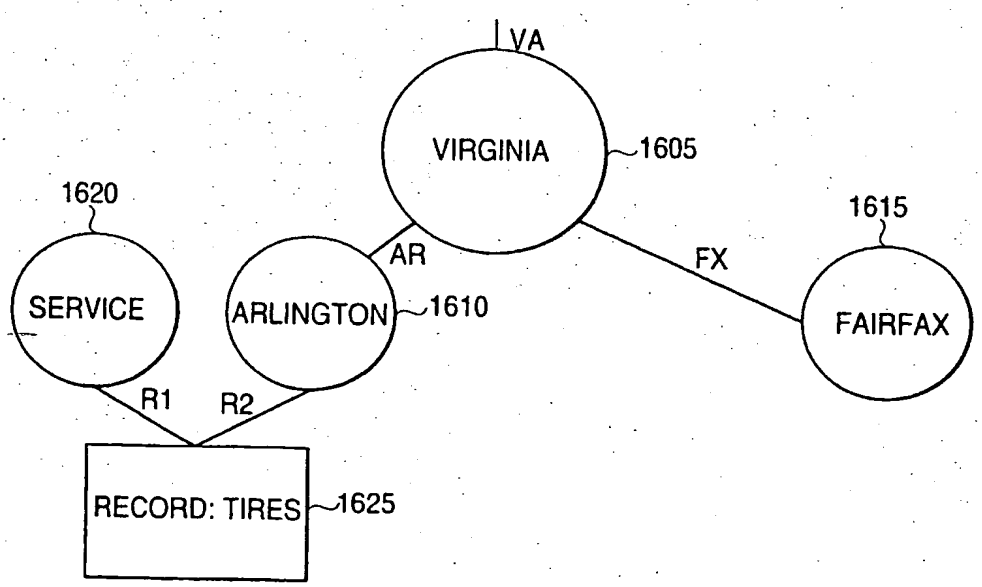


FIG. 16



15/17

FIG. 17

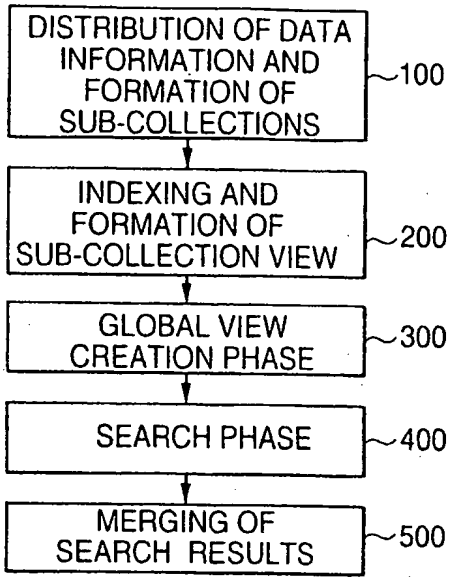


FIG. 18

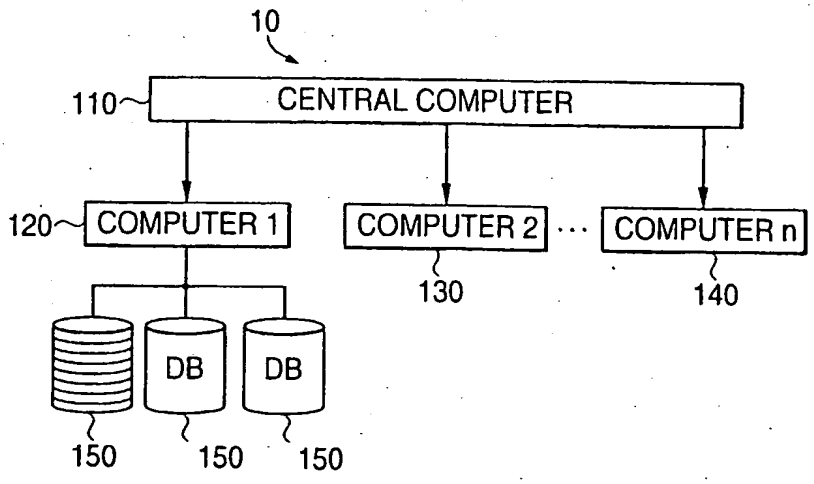


FIG. 19

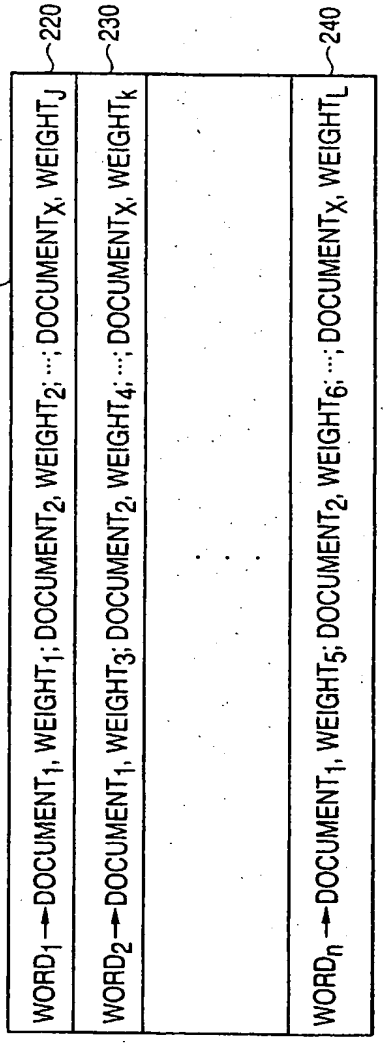


FIG. 20

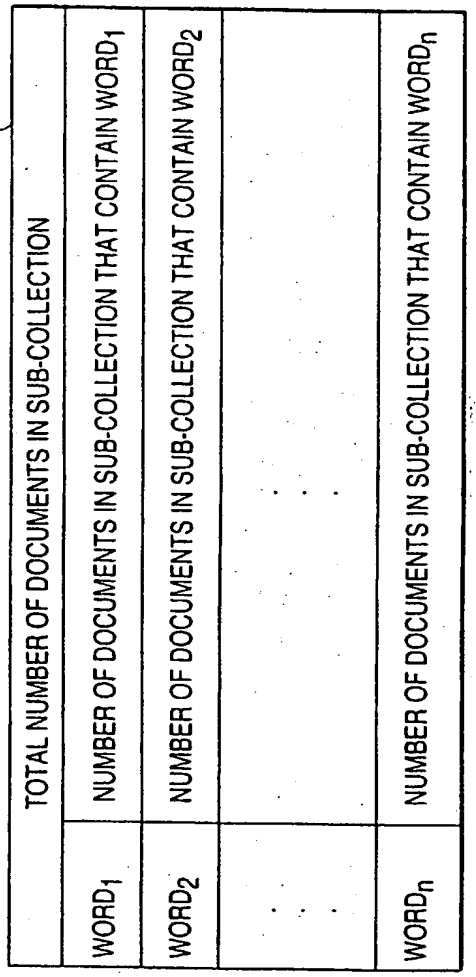


FIG. 21

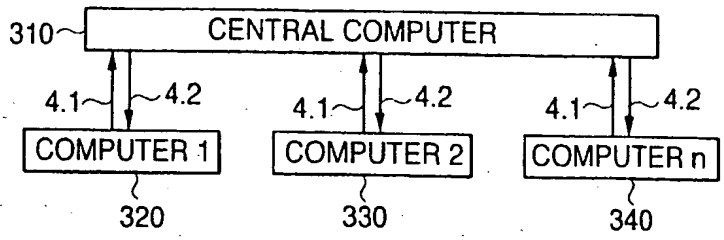


FIG. 22

510

TOTAL NUMBER OF DOCUMENTS IN ALL OF THE SUB-COLLECTIONS	
$WORD_1$	TOTAL NUMBER OF DOCUMENTS THAT CONTAIN $WORD_1$
$WORD_2$	TOTAL NUMBER OF DOCUMENTS THAT CONTAIN $WORD_2$
. . .	. . .
$WORD_n$	TOTAL NUMBER OF DOCUMENTS THAT CONTAIN $WORD_n$

INTERNATIONAL SEARCH REPORT

In... ... ...pplication No.
PCT/US01/10185

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : G06F 17/60
US CL : 705/1
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 705/1, 26, 27; 707/2, 3, 4, 5, 7, 101

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 6,163,782 A (SINGHAL) 19 December 2000 (19.12.2000), See entire document	1-68
A	US 6,035,294 A (FISH) 07 March 2000 (07.03.2000), See entire document	1-68
A,E	US 6,243,699 B1 (FISH) 05 June 2001 (05.06.2001), See entire document	1-68
A	US 5,930,474 A (DUNWORTH et al) 27 July 1999 (27.07.1999), See entire document	1-68
A	US 5,826,261 A (SPENCER) 20 October 1998 (20.10.1998), See entire document	1-68
A	US 5,675,786 A (MCKEE et al) 07 October 1997 (07.10.1999), See entire document	1-68
A	US 5,692,176 A (HOLT et al) 25 November 1997 (25.11.1997), See entire document	1-68
A	US 5,920,854 A (KIRSCH et al) 06 July 1999 (06.07.1999), See entire document	1-68
A	US 5,963,944 A (ADAMS) 05 October 1999 (05.10.1999), See entire document	1-68

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 June 2001 (08.06.2001)	05 JUL 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer James Trammell Telephone No. (703)305-9700

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